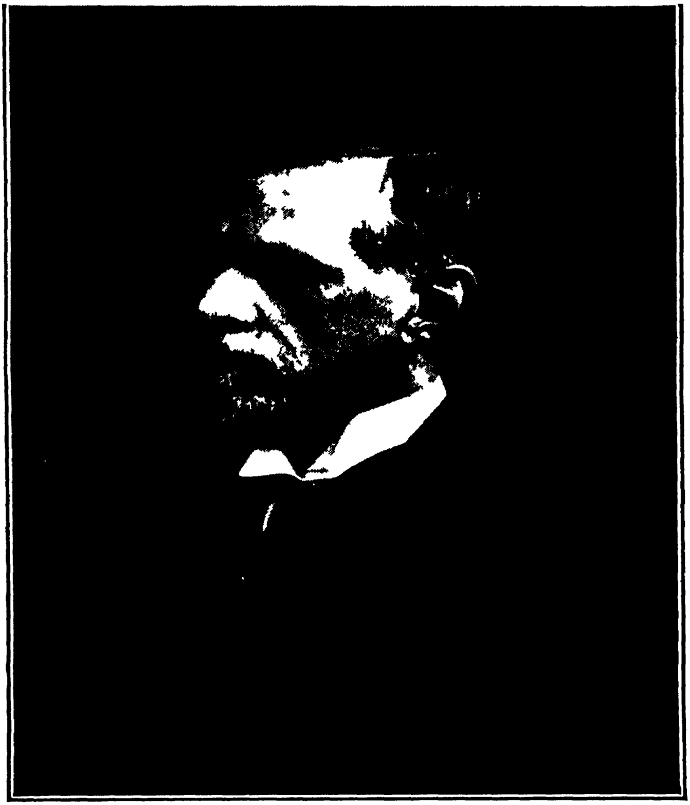

FRANCIS RANSOM, F.C.S.,
President 1909-1910

YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS

FROM JULY 1, 1909, TO JUNE 30, 1910,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-SEVENTH ANNUAL MEETING

HELD IN

CAMBRIDGE

JULY, 1910.

EDITOR OF THE YEAR-BOOK

J. O. BRAITHWAITE.

EDITORS OF THE TRANSACTIONS,

E. SAVILLE PECK, M.A.

HORACE FINNEMORE, B.Sc., F.I.C.

LONDON

J. & A. CHURCHILL, 7, GREAT MARLBOROUGH STREET.

1910.

British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following:—

1. **To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.**
2. **To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.**
3. **To maintain uncompromisingly the principle of purity in Medicine.**
4. **To form a bond of union amongst the various associations established for the advancement of the Science and Practice of Pharmacy, by receiving from them delegates to the annual Conference.**

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The minimum subscription shall be 7*s.* 6*d.* annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, a number of Vice-presidents not exceeding six, by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

⁂ Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

FORM OF NOMINATION.

I Nominate

(Name)..

(Address)..

as a Member of the British Pharmaceutical Conference.

Member

Date..

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary Brit. Pharm. Conf.*, 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

BRITISH PHARMACEUTICAL CONFERENCE

OFFICERS FOR 1910-1911.

PRESIDENT.

W. F. WELLS, PH.C., Dublin.

VICE-PRESIDENTS,

Who have filled the office of President.

JOHN ATTFIELD, PH.D., F.R.S., F.I.C., F.C.S., Watford.
S. R. ATKINS, J.P., Salisbury.
CHAS. UMNEY, F.I.C., F.C.S., London.
N. H. MARTIN, F.R.S.E., F.L.S., Newcastle-on-Tyne.
C. SYMES, PH.D., PH.C., F.C.S., Liverpool.
J. C. C. PAYNE, J.P., M.P.S.I., Belfast.
E. M. HOLMES, F.L.S., PH.C., London.
GEO. CLARIDGE DRUCE, M.A., F.L.S., J.P., Oxford.
T. H. W. IDRIS, L.C.C., F.C.S., London.
W. A. H. NAYLOR, F.I.C., F.C.S., London.
THOS. TYRER, F.I.C., F.C.S., London.
ROBERT WRIGHT, F.C.S., Buxton.
J. F. TOCHER, B.Sc., F.I.C., Peterhead.
FRANCIS RANSOM, F.C.S., Hitchin.

VICE-PRESIDENTS.

J. F. HARRINGTON, London.
J. P. GILMOUR, Glasgow.
JOHN SMITH, Dublin.
EDMUND WHITE, B.Sc., F.I.C., London.
HENRY G. GREENISH, F.I.C., F.L.S., London.
T. A. WHITE, Southsea.

HONORARY TREASURER.

J. C. UMNEY, F.C.S., London.

HONORARY GENERAL SECRETARIES.

E. SAVILLE PECK, M.A., Cambridge.
HORACE FINNEMORE, B.Sc., F.I.C., London.

HONORARY LOCAL SECRETARY.

T. O. BARLOW, 2, Palmerston Road, Southsea.

OTHER MEMBERS OF THE EXECUTIVE COMMITTEE.

F. H. ALCOCK, F.I.C., Birmingham.
F. W. BRANSON, F.I.C., Leeds.
E. F. HARRISON, B.Sc., F.I.C., London.
F. W. GAMBLE, London.
H. WIPPELL GADD, Exeter.
C. E. STUART, B.Sc., Newcastle.
D. LLOYD HOWARD, London.
W. A. BELL, Portsmouth.
T. MALTBY CLAGUE, Newcastle.

These Officers collectively constitute the Executive Committee.

ASSISTANT SECRETARY.

A. E. BREAKSPEAR, London.

AUDITORS.

I. BOURDAS, London, and W. P. ROBINSON, London.

HONORARY COLONIAL SECRETARIES.

For BENGAL	W. T. GRICE, F.C.S., Calcutta.
,, CANADA	J. BEMROSE, F.C.S., Montreal.
,, CAPE COLONY AND NATAL . .	A. WALSH, Cape Town.
,, NEW ZEALAND.	R. WILKINSON, Dunedin.
,, VICTORIA	H. SHILLINGLAW, Melbourne.
,, WEST INDIES	A. JAMES TAITT, Port of Spain.

BRITISH PHARMACEUTICAL CONFERENCE.

INAUGURAL MEETING HELD AT NEWCASTLE-ON-TYNE IN 1863.

Years.	Places of Meeting.	Presidents.	Vice-Presidents.	Local Secretaries.
1864	Bath . . .	HENRY DEANE, F.L.S.	Prof. BENTLEY. F.L.S. Dr. EDWARDS, F.C.S. R. W. GILES, F.C.S. Prof. REDWOOD, F.C.S.	J. C. POOLEY.
1865	Birmingham	HENRY DEANE, F.L.S.	Prof. BENTLEY, F.L.S. Dr. EDWARDS, F.C.S. W. SOUTHALL. J. P. TYLEE.	W. SOUTHALL, Jun.
1866	Nottingham	Prof. BENTLEY, F.L.S.	Dr. EDWARDS, F.C.S. D. HANBURY, F.R.S. SAMUEL PARR. W. W. STODDART, F.G.S.	J. H. ATHERTON, F.C.S.
1867	Dundee . .	Prof. BENTLEY, F.L.S.	D. HANBURY, F.R.S. J. INCE, F.L.S. D. RUSSELL. W. W. STODDART, F.G.S.	J. HODGE.
1868	Norwich .	DANIEL HANBURY, F.R.S.	R. FITCH, F.G.S. J. INCE, F.L.S. W. W. STODDART, F.G S J. R. YOUNG.	F. SUTTON, F.C.S.
1869	Exeter . .	DANIEL HANBURY, F.R.S.	G. COOPER. H. S. EVANS, F.C.S. J. INCE, F.L.S. W. W. STODDART, F.G.S.	M. HUSBAND.
1870	Liverpool .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. H. S. EVANS, F.C.S. J. INCE, F.L.S.	E. DAVIES, F.C.S. J. DUTTON (Birkenhead).
1871	Edinburgh .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. J. INCE, F.L.S. J. WILLIAMS, F.C.S.	J. MACKAY, F.C.S.
1872	Brighton .	H. B. BRADY, F.R.S.	J. INCE, F.L.S. R. REYNOLDS, F.C.S. W. D. SAVAGE J. WILLIAMS, F.C.S.	T. GLAISYER.
1873	Bradford .	H. B. BRADY, F.R.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. F. M. RIMMINGTON, F.C.S. J. WILLIAMS, F.C.S.	R. PARKINSON, Ph.D.
1874	London . .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. CHAS. H. SAVORY. J. WILLIAMS, F.C.S.	M. CARTEIGHE, F.C.S.
1875	Bristol . .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. CHAS. BOORNE. PETER SQUIRE, F.L.S.	J. PITMAN.
1876	Glasgow .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. E. C. C. STANFORD, F.C.S. D. FRAZER.	A. KINNINMONT.
1877	Plymouth .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. A. P. BALKWILL. J. WILLIAMS, F.C.S	R. J. CLARK.
1878	Dublin . .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE, F.C.S. R. REYNOLDS, F.C.S. R. W. PRING, L.A.H.D. J. WILLIAMS, F.C.S.	W. HAYES.
1879	Sheffield .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE. F.C.S. R. REYNOLDS, F.C.S. W. WARD, F.C.S. J. WILLIAMS, F.C.S	H. MALEHAM.
1880	Swansea .	W. SOUTHALL, F.L.S.	R. REYNOLDS, F.C.S. G. W. SANDFORD. W. WARD, F.C.S. N. M. GROSE.	J. HUGHES.
1881	York . .	R. REYNOLDS, F.C.S.	Prof. ATTFIELD, F.R.S. R. DAVISON. N. M. GROSE. C. UMNEY, F.C.S.	J. SOWRAY.
1882	Southampton	Prof. ATTFIELD, F.R.S.	R. CHIPPERFIELD. T. GREENISH, F.C.S. Prof. TICHBORNE, LL.D. J. R. YOUNG.	O. R. DAWSON.

BRITISH PHARMACEUTICAL CONFERENCE.

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries.*
1883	Southport .	Prof. ATTFIELD, F.R.S.	M. CARTEIGHE, F.C.S. W. V. RADLEY. C. UMNEY, F.C.S. J. R. YOUNG.	WM. ASHTON.
1884	Hastings .	J. WILLIAMS, F.C.S.	S. R. ATKINS. J. BELL. M. CARTEIGHE, F.C.S. J. R. YOUNG.	F. ROSSITER.
1885	Aberdeen .	J. B. STEPHENSON.	F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S. C. EKIN, F.C.S. J. P. KAY.	A. STRACHAN.
1886	Birmingham	T. GREENISH, F.C.S	T. BARCLAY. F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S C. EKIN, F.C.S.	CHAS. THOMPSON.
1887	Manchester	S. R. ATKINS, J.P.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. G. S. WOOLLEY.	F. B. BENGER, F.C.S.
1888	Bath . .	F. B. BENGER, F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. W. MARTINDALE, F C S.	H. HUTTON.
1889	Newcastle-on-Tyne	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. N. H. MARTIN, F.L.S.	T. M. CLAGUE.
1890	Leeds . .	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. A. KINNINMONT, F.C.S. W. SMEETON.	F. W. BRANSON, F.C.S.
1891	Cardiff . .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. A. KINNINMONT, F.C.S. J. C. THRESH, M.B., D.Sc. J. MUNDAY.	ALFRED COLEMAN
1892	Edinburgh .	E. C. C. STANFORD, F.C.S.	M. CARTEIGHE, F.C.S. W. GILMOUR, F.R.S.E. J. C. THRESH, M.B., D.Sc. J. R. YOUNG, J.P.	PETER BOA.
1893	Nottingham	OCTAVIUS CORDER.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. R. FITZ HUGH.	C. A. BOLTON.
1894	Oxford . .	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. R. H. DAVIES, F.C.S W. HAYES. G. T. PRIOR.	H. MATHEWS.
1895	Bournemouth	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. J. A. TOONE.	STEWART HARDWICK.
1896	Liverpool .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. M. CONROY, F.C.S. W. HAYES.	T. H. WARDLEWORTH. H. O. DUTTON (Birkenhead).
1897	Glasgow .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. W. F. WELLS. R. MCADAM.	J. A. RUSSELL.
1898	Belfast . .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. J. C. C. PAYNE, J.P. W. F. WELLS.	R. W. MCKNIGHT. W. J. RANKIN.
1899	Plymouth .	J. C. C. PAYNE, J.P., Ph.C.	WALTER HILLS, F.C.S. R. J. DOWNES. JOHN MOSS, F.I.C., F.C.S. C. J. PARK.	J. DAVY TURNEY.
1900	London. .	E. M. HOLMES, F.L.S., Ph.C.	R. J. DOWNES, Ph.C. WALTER HILLS, F.C.S. JOHN MOSS, F.I.C., F.C.S. J. F. HARRINGTON, Ph.C.	W. WARREN. HERBERT CRACKNELL.
1901	Dublin . .	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA, F.C.S. Prof. TICHBORNE, Ph.D.	J. I. BERNARD.

BRITISH PHARMACEUTICAL CONFERENCE.

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries.*
1902	Dundee .	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. CHAS. KERR. W. A. H. NAYLOR, F.I.C., F.C.S.	W. CUMMINGS.
1903	Bristol . .	T. H. W. IDRIS, M.P., F.C.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA. W. A. H. NAYLOR, F.I.C., F.C.S. J. W. WHITE.	H. E. BOORNE.
1904	Sheffield .	T. H. W. IDRIS, M.P., F.C.S.	G. D. BEGGS, M.P.S.I. D. B. DOTT, F.R.S.E., F.I.C. W. A. H. NAYLOR, F.I.C., F.C.S. G. T. W. NEWSHOLME, F.C.S. F. RANSOM, F.C.S.	H. ANTCLIFFE.
1905	Brighton .	W. A. H. NAYLOR, F.I.C.. F.C.S.	R. A. ROBINSON. D. B. DOTT. J. MONTGOMERY. W. H. GIBSON. F. RANSOM. H. G. GREENISH.	W. W. SAVAGE. C. G. YATES.
1906	Birmingham	W. A. H. NAYLOR, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. W. F. WELLS. F. RANSOM. H. G. GREENISH. T. BARCLAY.	C. THOMPSON.
1907	Manchester .	THOS. TYRER, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. J. A. WALSH. F. RANSOM. H. G. GREENISH. G. S. WOOLLEY.	W. KIRKBY.
1908	Aberdeen .	ROBT. WRIGHT, F.C.S.	J. R. YOUNG. G LUNAN. J. A. WALSH. W. GILES. H. G. GREENISH. F. RANSOM.	W. F. HAY.
1909	Newcastle .	J. F. TOCHER, B.Sc., F.I.C.	J. R. YOUNG. G. LUNAN. J. SMITH. GEORGE WEDDELL. F. RANSOM. H. G. GREENISH.	T. M. CLAGUE. H. W. NOBLE.
1910	Cambridge .	FRANCIS RANSOM, F.C.S.	J. F. HARRINGTON J P. GILMOUR. J. REYNOLDS GREEN, Sc.D., F.R.S. JOHN SMITH. EDMUND WHITE, B.Sc., F.I.C. HENRY G. GREENISH, F.I.C.	A. A. DECK. T. J. MALLETT.

TREASURERS (One).

1863 to 1870, H. B. BRADY, F.R.S.
1870 to 1877, GEORGE F SCHACHT, F.C.S.
1877 to 1884, C. EKIN, F.C.S.
1884 to 1888, C. UMNEY, F.I.C., F.C.S.
1888 to 1890, W. MARTINDALE, F.C.S.
1890 to 1893, R. H. DAVIES, F.I.C., F.C.S.
1893 to 1898, JOHN MOSS, F.I.C., F.C.S.
1898 to , JOHN C. UMNEY, Ph.C., F.C.S.

HONORARY GENERAL SECRETARIES (Two).

1863 to 1880, Prof. ATTFIELD, Ph.D., F.R.S.
1863 to 1871, RICHARD REYNOLDS, F.C.S.
1871 to 1884, F. BADEN BENGER, F.C.S.
1880 to 1882, M. CARTEIGHE, F.C.S.
1882 to 1886, SIDNEY PLOWMAN, F.R.C.S.
1884 to 1890, JOHN C. THRESH, M.B., D.Sc.
1886 to 1901, W. A. H. NAYLOR, F.I.C., F.C.S.
1890 to 1903, F. RANSOM, F.C.S.
1903 to 1909, EDMUND WHITE, B.Sc., F.I.C.
1901 to , E. SAVILLE PECK, M.A.
1909 to , HORACE FINNEMORE B.Sc., F.I.C.

LOCAL CORRESPONDING SECRETARIES.

District.	*Name.*	*District.*	*Name.*
Aberdeen	W. Giles.	Kettering	
Barnet	R. F. Young.	Kilmarnock	
Belfast	W. J. Rankin.	Kirkcaldy	David Storrar.
Birmingham	C. Thompson.	Leamington	H. Hutton.
Blackburn	R. Lord Gifford.	Leeds	F. P. Sargeant.
Bournemouth	Stewart Hardwick.	Leicester	Lewis Ough.
Bradford		Liverpool	
Bridge of Allan	J. Bain.	Malvern	A. Mander.
Brighton and Hove	R. A. Cripps.	Manchester	C. A. Johnstone.
Bristol	H. E. Boorne.	Montrose	A. Davidson.
Burton-on-Trent	G. Wright.	Morpeth	J. Whittle.
Buxton	R. Wright.	Newcastle-on-Tyne	T. Maltby Clague.
Cambridge	E. Saville Peck.	Newport (Mon.)	E. Davis.
Carlisle	J. Hallaway.	Nottingham	G. J. R. Parkes.
Cheltenham	F. J. Palmer.	Nuneaton	G. Iliffe.
Chester and Wrexham	W. F. J. Shepheard.	Oxford	G. Claridge Druce.
Chislehurst	J. G. Prebble.	Paisley	A. Fraser.
Cork	T. R. Lester.	Peterhead	J. F. Tocher.
Coventry		Plymouth	J. Davy Turney.
Derby	S. Taylor.	Ross (Hereford)	T. Matthews.
Doncaster	M. H. Stiles.	Salisbury	S. R. Atkins.
Dublin	W. F. Wells.	Sheffield	G.T.W. Newsholme.
Dundee	Wm. Cummings.	Shrewsbury	W. G. Cross.
Eastbourne		Southampton	H. Wilson.
Edinburgh	Peter Boa.	Southport	J. Righton.
Exeter	H. Wippell Gadd.	Spalding	E. Wightman Bell.
Glasgow	W. L. Currie.	Stockport	J. C. Arnfield.
Godalming	J. H. Mather.	Stockton	
Harrogate	C. E. J. Eynon.	Sunderland	C. Ranken.
Hastings and St. Leonards	F. Rossiter.	Swansea	
Hertford	G. S. Durrant.	Taunton	W. A. Wrenn.
Hitchin	F. Ransom.	Torquay	E. Quant.
Ilkley	G. W. Worfolk.	Tunbridge Wells	A. E. Hobbs.
Ipswich	E. C. Sayer.	Warrington	J. Rymer Young.
Kendal	G. Vogt.	Wolverhampton	F. J. Gibson.
		Worcester	C. W. Turner.

The duties the Local Corresponding Secretaries have undertaken to discharge are briefly as follows:—

(*a*) To bring under the notice of pharmacists, principals, and their assistants, in their districts, who are unassociated with the Conference, the advantage of membership with it, and by personal effort to try and induce them to join.

(*b*) To assist in stimulating research by asking pharmacists, who have the time, ability, and disposition, to contribute from time to time a paper or useful note to the annual meetings.

(*c*) To endeavour to induce defaulters to continue their membership.

(*d*) To take generally a watchful and sympathetic interest in the affairs of the Conference.

To render those services voluntarily at times convenient to themselves and as opportunity offers.

THE

BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by introducing new members, suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is published early in the year (see page 295). Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meeting for 1911 will be held at Portsmouth.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretaries, or any other officer or member. The yearly subscription is payable in advance, on January 1st. The amount, which includes free delivery of the Year-Book, is fixed at a minimum of 7*s.* 6*d.* for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY, BRIT. PHARM. CONF.,
17, Bloomsbury Square, London, W.C.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of 400 to 500 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, calls on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rule of the Conference, and a convenient form of nomination, will be found at page ii.

YEAR-BOOK OF PHARMACY

CHEMISTRY

ALKALOIDS

Aconite Root. (*Evans' Analytical Notes*, **1909**, 6.) The serious variation in alkaloidal strength of aconite root from various sources is shown by the five samples examined during the year.

English aconite was found to yield 1·26 per cent. of alkaloid by Panchaud's Et_2O–$CHCl_3$ process, and 0·64 per cent. of aconitine by the U.S.P. method. German aconite gave from 1·06 to 1·13 per cent. of alkaloid by the former process, and from 0·17 to 0·35 per cent. of aconitine by the latter. (See also *Y.B.*, **1906**, 6; **1909**, 4.)

The figures obtained by Panchaud's method in previous years have ranged from 1·05 to 1·78 per cent., the latter being obtained from a consignment of English root.

Aconite Root, Relative Proportion of Alkaloid in Bud and Stem. (*Southall's Report*, **1909**, 5.) The restriction of the B.P. to bud-crowned roots is shown to be justified. Three samples of the drug of foreign origin was separated into bud and stem. The latter amounted from 52 to 90 per cent. of the whole drug. The bud portions gave to from 0·47 to 0·32 per cent. of aconitine; the stems from 0·24 to 0·45 per cent. An English-grown bud-crowned root gave 0·58 per cent.

Aconitine, Melting Point of. H. Ribaut. (*Bull. Sci. pharm.*, 1910, **17**, 141.) The French Codex adopts the figure of Ehrenberg, 194°C., as the melting point of aconitine. Freund and

Beck, and also Schulze, give 197–198°C. But, as E. Merck has pointed out, these figures are really of little value, since aconitine undergoes decomposition at a lower temperature than this. The author has determined the point of instantaneous fusion, and finds it to be much higher, 204–205°C. Even this may be somewhat low, for the aconitine, the product of one of the most celebrated French houses, gave a slight brown colouration with H_2SO_4, so it may not have been quite pure.

Aconitum laciniatum, Amount of Alkaloids in. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 51.) J. C. Umney has found the museum specimen of this root to yield 0 92 per cent. of ether soluble alkaloids, by the U.S.P. assay method. (See also *Y.B.*, **1906**, 92.)

Adrenine, Colorimetric Determination of. A. Zangfrognini. (*Pharm. Zeit.*, 1909, **54**, 889.) A reagent is prepared with $KMnO_4$ 3 Gm.; water 24 c.c.; lactic acid 8 c.c. The brown oxide thus formed gives an intense red colour reaction with adrenine, which is very evident with a 1 : 1,000,000 solution of the base. The depth of colour is directly proportioned to the amount of adrenine present, and is permanent for several hours. In making the colorimetric determination, the mixture of the reagent with a known volume of the adrenine solution may be conveniently diluted to the depth of colour produced by a standard 1 : 1,000,000 solution of the base. (See also *Y.B.*, **1908**, 261; **1909**, 131.)

Ageratum conyzoïdes and A. mexicanum, Alkaloid from. J. Chevalier. (*L'Union pharm.*, 1910, **51**, 211.) *Ageratum conyzoïdes* is highly esteemed as a remedy for metrorrhagia by the natives of South America. The author finds that it contains an alkaloid which forms a crystalline hydrobromide. *Ageratum mexicanum*, largely used as a bedding plant in European gardens, also contains this base, but in less amount. It acts as a vaso-constrictor, resembling in this respect the action of ergot. It has a very low toxicity, and does not exert any marked action on the heart.

Alkaloidal Reaction with Hydrogen Peroxide. E. Schaer. (*Apoth. Zeit.*, 1909, **24**, 764.) A mixture of a small quantity of H_2O_2 in the form of perhydrol, with strong H_2SO_4 gives a useful reagent, affording distinctive colour reactions with many alkaloids, even with those which give negative results with ordinary

test solutions. Thus, quinine gives an intense yellow colour, which is as marked and evident as the thalleioquin reaction. Nicotine gives a deep chocolate brown colour. Strychnine gives a bright reddish purple colour, which appears slowly, but is very certain. In some instances, the sensitivity of the reagent is increased by the addition of a trace of colloidal platinum. A mixture of H_2O_2 and HCl may be substituted with advantage for the usual reagents in the thalleioquin reaction for quinine, and for the HCl and AmOH in the murexide test for caffeine and theobromine.

Alkaloids, Distribution of and Formation of, in Jaborandi and in Coca. O. Tunmann. (*Zeits. angew. Chem.*, 1909, 22, 1987.) The alkaloids occur in both these plants mainly in the cells poor in chlorophyll; the oxalate cells are always free from alkaloids. In *Pilocarpus* the largest amount of alkaloid occurs in the foliary epidermis, especially on the upper surface; chlorophyll granules contain no alkaloid. Tropical plants grown in glass houses in Europe may produce as much or more alkaloid as in their natural state. But this is found to vary in individual plants grown under similar conditions. In *Pilocarpus* the flower stalks and buds contain the most alkaloid (0·51 and 0·44 per cent.); the stems the least (0·18 per cent.); the leaves and petioles, 0·23–0·24 per cent. The absolute quantity of alkaloid in the leaves increases as the leaf develops, but the percentage decreases. If stored in a damp room, the alkaloid content of jaborandi leaves rapidly diminishes; as much as 50 per cent. in six weeks being lost. In the case of *Coca* leaves the quantity of alkaloid does not increase with the age of the leaf. The alkaloids from *Coca* seeds are almost entirely extracted by the steeping water in the process of germination, but the seedling, four days old, contains newly-formed alkaloid immediately under the root-point. Both in *Pilocarpus* and *Coca* the alkaloids are waste products which play the part of secretions. The alkaloid-bearing tissues of the pith and the inner nerve-parenchyma are sharply differentiated from their alkaloid-free surroundings, and are analogous to other secreting tissues.

Alkaloids, Total, in Drugs, Official Method for, of the U.S. Department of Agriculture. (*Circ. No.* 25, *March*, 1910, 14.) The following methods are to replace those prescribed in former bulletins. Ten Gm. of the drug is shaken for several minutes with 75 c.c. of a mixture of Et_2O, 5; and $CHCl_3$ 1, by volume;

then 5 c.c. of AmOH 10 per cent. is added, and the mixture is shaken for two hours. As much as possible is then transferred to a small percolator, 25 mm. in diameter and 25 cm. long, the neck of which is plugged with cotton wool. The residue of the drug is placed in the percolator, and the flask is rinsed out with more of the Et_2O–$CHCl_3$ mixture. The drug is packed down with a piece of cotton wool and percolated with the same mixture until the percolate gives no precipitate, when 2 c.c. are evaporated, treated with 2 c.c. of N/10 HCl, filtered and tested with Mayer's solution. The percolate is evaporated to 10 c.c., the temperature not exceeding 70°C. The residue is treated with 10 c.c. of 2 per cent. H_2SO_4, shaken round for one minute and transferred to a separator. The flask which contained the residue is rinsed out successively with 25 c.c. of Et_2O, 10 c.c. of 2 per cent. H_2SO_4, 25 c.c. Et_2O, and 5 c.c. of water. The separator is shaken, care being taken that the acid is in excess, and the acid solution filtered into another separator. This operation is repeated three or more times with 15 c.c. portions of the acid, till 10 drops of the last portion give no reaction with Mayer's solution. The acid solution is washed with 10 c.c. of Et_2O–$CHCl_3$ mixture (1 to 3 by volume), the operation being repeated till no more colour is acquired by the mixture. The combined Et_2O–$CHCl_3$ washings are shaken with 10 c.c. of water and the water added to the acid solution. The acid solution is made alkaline with AmOH and shaken out with four or more portions of Et_2O–$CHCl_3$ (1 : 3), until the residue left on evaporating 20 drops gives no reaction with 1 c.c. of N/10 HCl and 2 drops of Mayer's solution. The Et_2O–$CHCl_3$ extracts are united, washed with 5 c.c. of water, and evaporated at a temperature not exceeding 70°C. Three c.c. of Et_2O is added to the residue, which is dried until constant at not above 70°C. Or the residue may be dissolved in 5 c.c. of EtOH and 15 c.c. of water added. It can then be titrated with N/50 H_2SO_4, using cochineal as indicator. Instead of dealing with the total extract, an aliquot portion may be used. Fifteen Gms. of the powdered drug are shaken with 150 c.c. of Et_2O–$CHCl_3$ mixture (5 : 1) and 5 c.c. of 10 per cent. AmOH as before. Fifteen c.c. of water are added to agglomerate the drug, which is allowed to settle, and 100 c.c. of the clear liquid are decanted. This clear solution, representing 10 Gm. of original drug, is then treated as above.

Apomorphine hydrochloride, German, Doubtful Purity of

Certain Brands. E. Harnack and H. Hildebrandt. (*Pharm. Zeit.*, 1909, **54**, 938; G. Frerichs (*Apoth. Zeit.*, 1909, **24**, 928); A. Voswinkel (*ibid.*, 939); Harnack and Hildebrandt (*Pharm. Zeit.*, 1910, **55**, 6); Frerichs (*Apoth. Zeit.*, **25**, 14). The first-named authors called attention to the unreliability of certain commercial brands of apomorphine hydrochloride. One of these was stated to contain from 66 to 75 per cent. of another salt, trimorphine hydrochloride. Frerichs pointed out that trimorphine hydrochloride was already on the market in a relatively pure state, and containing at the most not more than a trace of apomorphine hydrochloride. False apomorphine hydrochloride contaminated with trimorphine hydrochloride, or with unaltered morphine hydrochloride, may be readily tested thus: 0·1 Gm. is placed on a dry filter and washed with 5 c.c. of a mixture of HCl 1, and water 4. The filtrate should show only an opalescence when treated with Mayer's solution, so small is the solubility of pure apomorphine hydrochloride in the acid. If only 10 per cent. of trimorphine hydrochloride be present, a curdy precipitate will result; and if morphine, a gelatinous precipitate. Voswinkle claims that the so-called "apomorphine" is not a definite single substance, but a mixture of decomposition bases; so that the salt under notice cannot be called "adulterated" or "false," if it does not consist of one substance only. Harnack and Hildebrandt state that it is not possible to separate the hydrochlorides of apomorphine and trimorphine very sharply by salting out with strong hydrochloric acid, since the latter greatly increases the solubility of the former. Thus, when the two salts are together in the ratio of apomorphine hydrochloride 2: trimorphine 3, partial crystallization results. But when the ratio is 2 : 4 no separation follows. The impure commercial salt is probably a tetramorphine, or $(C_{17}H_{19}O_3N \cdot HCl)_3 + C_{17}H_{17}O_2N \cdot HCl$. Frerichs rejoins, strongly refuting Voswinkel's statement that apomorphine hydrochloride is not a single chemical substance, and states that the trade specimens under discussion entirely meet the requirements of the Ph. G. IV.

• Atropine Group of Mydriatic Alkaloids and Salts, Preparation and Characters of. G. Cohn. (*Pharm. Zentralh.*, 1910, **51**, 369.) *Atropine*, $C_{17}H_{23}NO_3$. Hyoscyamine, the stereoisomer of atropine, is converted into the latter by treating the solution in absolute alcohol with sodium. After standing 24 hours, the

sodium is precipitated as Na_2CO_3, and the filtrate is evaporated *in vacuo*. Atropine is then precipitated by diluting with water. Hyoscyamine is also converted into atropine by exposing it for a time, above its melting point. Methods of preparing the base synthetically are also described. *Atropine stearate* forms white crystals, soluble in fats; used for ointments and oily preparations. *Atropine nitrite*, $C_{17}H_{28}NO_3HNO_2$. Almost white crystals, soluble in water and alcohol. Used as a spray for asthma. *Homatropine*, $C_{16}H_{21}NO_3$, is mandelic acid tropeine. Obtained, among other processes, by passing HCl gas through a mixture of tropine and mandelic acid. *Mydrine* is a mixture of ephedrine with a little homatropine. Used as a rapid and powerful mydriatic. Its solutions keep very well. *Lactyltropine benzoyltropeine*, and many other tropeine compounds, are fully described. *Tropacocaine*, benzoyl-pseudo-tropine, $C_{15}H_{19}NO_2$. The hydrochloride forms white readily soluble needles; m.p. 276–277°C. Its solutions are antiseptic, and retain their anaesthetic power for two months. *Scopolamine*, $C_{17}H_{21}NO_4$, and several scopoline esters are briefly noted. Among the quaternary bases of the atropine group dealt with are: *Atropine-bromomethylate*, $C_{17}H_{23}NO_3.CH_3Br$, which has been used as an anhydrotic and a sedative. It is probaby the main constituent in "Eupneumas" an asthma remedy. *Atropine methylnitrate, Eumydrine*, $C_{17}H_{23}NO_3.CH_3NO_3$, is obtained by treating a solution of atropine iodomethylate with silver nitrate. The AgCl is filtered out and the filtrate is evaporated *in vacuo*. Eumydrine then forms white crystals, m.p. 163°C. Other methods of preparation are also described. The toxicity of eumydrine is stated to be 50 times less than that of atropine, while the mydriatic action is ten times less. *Atropine ethylnitrate*, *homotropine bromo-methylate*, *hyoscyamine bromomethylate* and *scopolamine bromo-methylate* are also described.

Belladonna Extract (Green). (*Evans' Analytical Notes*, **1909**, **13**.) Eleven samples of the official green extract were examined. Two of these, from outside sources, gave 0·3 per cent. of alkaloid. A genuine extract should yield not much less than 0·8 per cent. (by titration) of total alkaloids.

The assay is best performed by first thoroughly mixing the extract with several times its weight of sand and extracting the product with a mixture of Et_2O, $CHCl_3$ and AmOH solution by maceration and vigorous shaking. By commencing in this

manner the estimation can be completed in the ordinary way, and all troublesome emulsions avoided. (See also *Y.B.*, **1909,** 15.)

Belladonna, French, Green Extract of, Alkaloid Value of. — André. (*J, Pharm. Chim.*, 1909, **30,** 249.) As the result of his own experiments, and from the examination of commercial samples of extract of belladonna from fresh juice, the author concludes that a standard of 2 per cent. of alkaloids is sufficiently high, and that it would be difficult to attain the 4 per cent. named as the standard by Warin (*Y.B.*, **1908,** 28).

Belladonna Root. (*Evans' Analyt. Notes,* **1909,** 14.) The 17 samples assayed during the year have maintained a fair standard of quality. The results obtained were :—

Alkaloid, 0 6 per cent. and over, 5 samples (1 sample 0·68 per cent.) ; 0 5 per cent. and over, 7 samples ; 0·4 per cent. and over, 4 samples ; 0·2 per cent. and over, 1 sample (0·21 per cent.).

Much foreign root is spoiled for pharmaceutical uses by lack of care in drying. Such samples possess a strong empyreumatic odour, the interior of the roots being often horny and blackened by fermentation and intense heat. Roots of this description are often rich in alkaloid. This class of drug yields much extractive matter to alcoholic menstrua, and produces very dark, strong-smelling galenicals; but apart from the latter disadvantages, it would be unsafe to rely upon the alkaloid being unaltered. Five samples examined during November were carefully dried and free from torrified roots. The presence of the latter occurs more frequently in the earlier part of the year. (See also *Y.B.*, **1909,** 16.)

Betaines and Choline accompanying Caffeine. K. Polstorff and O. Goertc. (*Chem. Zentralblatt,* 1909, **2,** 2014.) Most of the caffeine and theobromine-containing drugs also yield betaines or choline. Betaine, $C_5H_{11}O_2N$, occurs in kola nuts; trigonelline, $C_7H_7O_2N$, in coffee; choline, $C_5H_{15}O_2N$, in tea, guarana, and cacao beans.

Caffeine, Accurate Method of Determination in Coffee. J. Burmann. (*Bull. Soc. Chim.*, 1910, **7,** 239.) Five Gm. of the finely ground coffee is dried at 100° and weighed to determine the loss. The dry residue is then extracted by agitation for 10 minutes with 100 c.c. of petroleum ether, and filtered; the insoluble residue is again shaken with 25 c.c. of the same solvent, and washed on the filter with another 25 c.c. The

bulked petroleum ether filtrate is distilled and the oily residue weighed, when dried, to determine the fat. The fat free coffee, dried in the air, is then transferred to a 200 c.c. stoppered flask, treated with 150 Gm. of $CHCl_3$, shaken for a few minutes, when AmOH solution, 10 per cent., 5 Gm., is added. The whole is vigorously shaken for 30 minutes, and then filtered through two filters previously moistened with $CHCl_3$. On distilling off the $CHCl_3$ from a tared flask the residue is weighed as crude caffeine. This is dissolved in a very little $CHCl_3$, and transferred, with washings, into a test tube about 15–18 cm. long and 15 to 18 mm. in diameter, with two constrictions, one near the top, the other near the bottom. These constrictions lessen the internal diameter, where they occur, by about one-half. The $CHCl_3$ is then evaporated off, and the tube and contents are dried at 100°C. or *in vacuo*. Some pure dry asbestos is then inserted lightly into each constriction, and the lower part of the tube is immersed in a paraffin bath and maintained at about 210–240°C. for three hours. The caffeine then sublimes through the lower asbestos pad, and crystallizes in the upper part of the tube, between the two constrictions. The lower portion of the tube is then filed and broken off, and the pure sublimed caffeine weighed after being transferred by means of $CHCl_3$ to a small tared capsule. A correction of 2·5 Mgm. is made to the weight found. If desired, the caffeine may be resublimed and reweighed. It will then be absolutely pure. (See also *Y.B.*, **1907,** 28; **1909,** 22.)

Calycanthus glaucus, Further Note on Alkaloids of. H. M. Gordin. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 889.) Continuing his investigations (*Y.B.*, **1905, 53**; **1906,** 18; **1909,** 23), the author has succeeded in preparing isocalycanthine directly, in the anhydrous condition. The crystalline base dissolves in $CHCl_3$ with separation of water of crystallization; on shaking the turbid solution with anhydrous K_2CO_3 and filtering, and keeping the filtrate *in vacuo* over paraffin until all the $CHCl_3$ is absorbed by the latter, a crystalline mass of anhydrous calycanthine is obtained. A quicker method is to pass a brisk current of dry H over the surface of the $CHCl_3$ solution, and adding a considerable amount of petroleum ether. Most of the alkaloid crystallizes out in one night. Thus obtained it has a slight yellowish tint; it begins to darken at 220°C. and melts at 235–236°C. A further series of salts is described.

Carpaine, Constitution of. *Part I.* G. Barger. (*Proc. Chem. Soc.*, 1910, **26**, 53.) Carpaïne, the alkaloid from the leaves of *Carica papaya*, was discovered by Greshoff, and has been further examined by Merck and by van Ryn, who found that it is a secondary base of the formula $C_{14}H_{25}O_2N$. In the present investigation it has been so far shown that carpaine is hydrolysed by acids and baryta to a substance, $C_{14}H_{27}O_3N$, soluble in water, which contains a carboxyl group and is also a base. It closely resembles certain amino-acids, and the name *carpamic acid* is suggested for it. When heated with alcoholic HCl, carpaine yields the hydrochloride of *ethyl carpamate*, $C_{13}H_{26}ON.CO_2C_2H_5,HCl$. The hydrochloride of carpaine is transformed by chlorine into a very unstable, neutral substance, $C_{14}H_{23}O_3NCl_2$, insoluble in water and melting at 77°C. after crystallization from methyl alcohol. The yield of all the above substances is quantitative. On oxidation by $KMnO_4$ in acetone solution, a nitrogenous acid results, from which ultimately a minute quantity of a crystalline dibasic acid, $C_8H_{14}O_4$, can be obtained, probably $a\delta$-dimethyladipic acid. The latter acid is also produced, in very much larger quantity, by oxidation of carpaine with HNO_3.

Chinosol, Characters and Tests for. F. Zernik (*Pharm. Zentralh.*, 1909, **50**, 772.) Chinosol, neutral ortho-oxyquinoline sulphate, should be a light yellow crystalline powder, with a saffron-like odour and a burning taste. Melting point, 175° to 177·5°C. Readily soluble in water; sparingly so in Et_2O. The 1 : 50 aqueous solution is acid in reaction; a drop of Fe_2Cl_6 reagent gives an intense green colour with it, and $BaCl_2$ a white precipitate. Na_2CO_3 liberates ortho-oxyquinoline as a white precipitate, forming felted needles on standing. When these are collected, washed and dried, they should melt at 73–75°C.

Cinchona Alkaloids, Double Salts, and Compounds; Preparation of. G. Cohn. (*Pharm. Zentralh.*, 1910, **51**, 265, 289.) *Quinine sulphate-hydrochloride*, $(C_{20}H_{24}N_2O_2)_2 \cdot 2HCl \cdot H_2SO_4 + 3H_2O$. This salt is much more soluble than the ordinary sulphate. Quinine basic sulphate, 30, is dissolved in HCl, sp. gr. 1·05, 24·9. The water is evaporated off *in vacuo*; or else gaseous HCl may be used. The salt separates in nodules of acicular needles which lose their H_2O at 100–108°C. *Quinine sulphate-hydrobromide* is prepared in a similar manner taking HBr (sp. gr. 1·180), 21. This salt is soluble in water 1 : 3. *Quinine hydro-*

bromide, $C_{20}H_{24}N_2O_2 \cdot HBr + H_2O$. A boiling solution of quinine sulphate 100; in water 800, is added to a boiling solution of $BaBr_2$ 38, in water 250. The filtrate is evaporated at a gentle heat. The salt dissolves in cold water 1 : 55 ; in boiling water 1 : 1 ; in $CHCl_3$ 1 : 10; in EtOH 90 per cent. 1 : 7; and in Et_2O, sp. gr. ·720, 1 : 1730. *Quinine dihydrobromide*, $C_{20}H_{24}N_2O_2 \cdot 2HBr + 3H_2O$. Quinine sulphate 100, is dissolved in dilute H_2SO_4, sp. gr. 1·110 to 1·140, 67 5, and water 800. This solution is added to $BaBr_2$ 76, dissolved in water 200. Solubility in water 1 : 7. *Quinine hydroiodide*, $C_{20}H_{24}N_2O_2 \cdot HI$. A solution of quinine hydrochloride 10, in warm water 300, is mixed with a solution of KI 6, in water 12. After a few hours, a yellowish resinous precipitate separates, which is dried, at a gentle heat. *Quinine dihydroiodate.* $C_{20}H_{24}N_2O_2 \cdot 2HIO_3$. A white powder, readily soluble in water. *Quinine ethyl sulphate*, $C_{20}H_{24}N_2O_2 \cdot C_2H_5OSO_3H$. Quinine acid sulphate 100, is treated with crystalline barium ethyl sulphate 39, in alcoholic solution. The filtrate evaporated at gentle heat affords about 100 of a crystalline powder readily soluble in water. *Quinine phosphate.* $(C_{20}H_{24}N_2O_2)_2H_3PO_4 + 8H_2O$. A solution of quinine hydrochloride 10, in water 300, is precipitated with a solution of Na_2HPO_4 4·6, in water 100. The precipitate is collected and crystallized from boiling water. It forms colourless, long, silky needles soluble in water about 1 : 700. *Quinine hydrochlorophosphate*, $C_{20}H_{24}N_2O_2 \cdot HCl \cdot H_3PO_4 + 3H_2O$(?). Quinine hydrochloride 35, is dissolved in a warm mixture of H_3PO_4, sp. gr. 1·154, 70 ; and dilute HCl, 12·5 per cent., 9. The salt crystallizes out gradually. It is soluble in water 1 : 2. *Quinine glycerophosphate*, $(C_{20}H_{24}N_2O_2)_2C_3H_7O_3 \cdot H_2PO_3 + 3H_2O$. A solution of calcium glycerophosphate 10 ; in water 300, is mixed with a solution of quinine hydrochloride 34·8 in water 1,000. It forms small needle-shaped crystals or a white powder soluble to a clear solution in hot water or alcohol. *Quinine acid glycerophosphate*, $C_{20}H_{24}N_2O_2 \cdot C_3H_7O_3 \cdot H_3PO_3 + 10H_2O$ forms a moist powder. Obtained by the combination of the equivalent amount of quinine alkaloid in ether solution, with an alcoholic solution of glycerophosphoric acid. *Quinine phytinate*, $C_{20}H_{24}N_2O_2 \cdot (OH)_2 \cdot OP{-}O{-}CH_2{-}O{-}CH_2{-}O \cdot PO(OH_2)$. Obtained by saturating phytinic acid with quinine alkaloid and evaporating the solution *in vacuo*. A yellowish white crystalline powder. *Quinine formate*, $C_{20}H_{24}N_2O_2 \cdot CH_2O_2$. White glittering needles ; m.p. 132°C. Contains most

quinine of all salts, viz., 87·5 per cent. *Quinine valerianate*, $C_{20}H_{24}N_2O_2 \cdot C_5H_1O_2$. The quinine hydrate, freshly precipitated from quinine sulphate 40, is dissolved, while still moist, in alcohol and neutralized with valerianic acid. The solution is evaporated at about 25°C. Brittle needle-shaped prismatic or oblique rhombic, tabular crystals; soluble 1 : 160 in cold water; about 1 : 1 in alcohol. *Quinine camphorate* $(C_{20}H_{24}N_2O_2)_2 C_{10}H_{16}O_4 + 4H_2O$. Obtained by evaporating together alcoholic solutions of camphoric acid, 10; and quinine trihydrate, 37·8. *Quinine salicylate*, $C_{20}H_{24}N_2O_2 \cdot C_7H_6O_3 + H_2O$. Quinine sulphate 10, is added, with constant stirring, to a solution of sodium salicylate 3·87, in hot boiling water 120. The salt separates in colourless or slightly reddish crystals, soluble 1 : 230 of water at 100°C.; 1 : 25 in EtOH; very soluble in $CHCl_3$. *Quinine basic acetyl salicylate; Aspirine-quinine*, $C_{20}H_{24}N_2O_2 \cdot C_6H_4 : OCOCH_3 \cdot COOH$. Ether solutions of quinine alkaloid, 378, and of acetyl-salicylic acid 180, are mixed. The salt separates out quantitatively in 12 hours. It is a white crystalline powder, permanent in the air; m.p. 157°C.; soluble in water 3 : 1000. 2·5 : 100 in EtOH; 1 : 10 in $CHCl_3$. *Quinine anhydro - methylene - citro - disalicylate*; *Quinine - novaspirine*, $C_{20}H_{24}N_2O_2 \cdot C_{21}H_{16}O_{11}$. A white powder, insoluble in water, soluble in EtOH, very soluble in $CHCl_3$. *Acid Quinine dibromosalicylate*; *Bromo-quinol*, $C_{20}H_{24}N_2O_2 \cdot 2C_6H_2Br_2(OH)COOH$. Yellowish crystals; m.p. 197–198°C.; sparingly soluble in water, EtOH and Et_2O. *Quinine guaiacol-sulphonate*; *Sulphoguaiacine*; *guaiaquin*, $C_{20}H_{24}N_2O_2 \cdot C_7H_7O_2—SO_3H$. The sulphonic acid is prepared with equal parts of guaiacol and H_2SO_4, which is then converted into the Ba salt. The latter is decomposed with quinine sulphate. The filtrate is evaporated and yields the salt in small, yellowish scales, soluble in water and in alcohol. *Quinine eosolate* (*acetylcreosotetrisulphonate*) $(C_{20}H_{24}N_2O_2)$ $3\,C_9H_7S_3O_{12}$. *Quinine β - naphthol - α - monosulphonate*; *quinaphthol*. $C_{20}H_{24}N_2O_2 \cdot (C_{10}H_6(OH)SO_3H)_2$. Obtained by precipitating a solution of quinine hydrochloride with a solution of sodium β-naphthol sulphonate. A yellow, crystalline powder sparingly soluble in hot water and in alcohol; m.p. 185–186°C. *Quinine arsenite*, $(C_{20}H_{24}N_2O_2)_3H_3AsO_3 + 4H_2O$. Silver arsenite 100, and quinine hydrochloride 226, are boiled together with alcohol, 70 per cent., under a flow-back condenser. The solution is then evaporated spontaneously. It forms long, concentrically grouped needles; soluble 1 : 150 in hot water;

readily soluble in EtOH, Et_2O, and $CHCl_3$. *Quinine para-amidophenylarsenate* (*arsanilate*), $C_{20}H_{24}N_2O_2 \cdot NH_2 - C_6H_4 - AsO_3H$. Solutions of quinine hydrochloride 40, and of atoxyl 31, are mixed. The quinine salt is precipitated almost quantitatively, in minute needles, soluble 1 : 635 in water; readily dissolved by hot EtOH and MeOH; m.p. 202°C. *Quinine tannate*: Quinine sulphate 1 is dissolved in water 30, by the aid of a little acetic acid; a solution of tannin 1·8, in water 18, is then gradually added. The greater part of the free acid is then neutralized with AmOH, and the precipitate dried at below 35°C. Soluble in water 1 : 50. *Quinine nucleinate*: Prepared from quinine 6, nucleinic acid 4. A yellowish powder insoluble in water. Employed as a hypodermic injection suspended in olive oil 1 : 20. *Quinine saccharinate*, $C_{20}H_{24}N_2O_2 \cdot C_6H_4 : CO\,SO_2\,NH$. An alcoholic or aqueous solution of saccharin is neutralized with quinine alkaloid. The salt may be either amorphous or crystalline. *Quinine urea hydrochloride*, $C_{20}H_{24}N_2O_2 \cdot HCl + NH_2 \cdot CONH_2\,HCl + 5H_2O$. Quinine hydrochloride 400, is dissolved in HCl, sp. gr. 1·061, 300; pure urea, 60 to 61, is added, and the double salt allowed to crystallize out. Or equal molecular weights of the two hydrochlorides may be dissolved together in hot water, and the compound crystallized. It forms hard, white or transparent prisms soluble 1 : 1 in hot water; m.p. 70 to 75°C. *Quinine urethane*, $C_{20}H_{24}N_2O_2HCl + 2NH_2 \cdot COOC_2H_5$. Obtained by dissolving quinine hydrochloride 3, and urethane 1·5 in warm water 3. The compound is very soluble. The hydrobromide compound is obtained in a similar manner. *Quinine dibromoguaiacol*; *Guaiaquinol*, $C_{20}H_{24}N_2O_2 \cdot C_6H_2Br_2(OCH_3)(OH)$. Yellow clinorhombic prisms, soluble 1 : 2·5 in water at 15° and 2 : 1 at 30°C. *Quinine lygosinate*; *quinine di-orthocumaroketone*, $C_{20}H_{24}N_2O_2 \cdot CO : (CH : CH \cdot C_6H_4 \cdot OCH_3)_2$. The Na salt of the ketone is prepared by condensing salicylaldehyde and acetone with NaOH. It forms metallic-green prisms containing 1 mol. H_2O. The quinine salt is a bulky light red odourless powder, insoluble in water, soluble about 3 : 20 in alcohol. *Aescoquinine*. A compound of quinine and aesculin from horse-chestnut seeds. An amorphous yellowish powder almost insoluble in water. *Quinine pilocarpine*: Alkaloidal pilocarpine combines when heated in an oil-bath with twice its weight of neutral quinine hydrochloride to form a solid, readily soluble compound; m.p. 98–99°C. The double compound crystallizes out from water, and

is sparingly soluble in Et_2O, readily in $CHCl_3$ and EtOH. *Quinine-caffeine hydrochloride*: Quinine hydrochloride 2, caffeine 1, are dissolved in water 6, at about 60°C. The greater part of the water is then evaporated off and the double compound crystallized out. Or quinine hydrochloride 2, and caffeine 1, may be melted together at about 125°C.; the melted mass is taken up with water, Et_2O, or $CHCl_3$ and crystallized. The product is a chemical compound. The corresponding *hydrobromide* compound may be similarly prepared by heating together quinine hydrobromide 66 and caffeine 34; the *hydroiodide* by mixing quinine hydroiodide 67·5, with caffeine 32·5, both dissolved in $CHCl_3$, and then evaporating the solvent. *Acetylquinine*, $C_{20}H_{23}N_2O_2COCH_3$. May be prepared thus: (1) Quinine alkaloid is heated for several hours at 60–80°C. with acetic anhydride 75. The product is diluted with water, and the acetylquinine is precipitated with AmOH. After drying, it is crystallized from petroleum ether; m.p. 116-117°C. (2) Quinine alkaloid 32 4, is heated for several hours at 120–130°C. with phenyl acetate 13·6. The melt is dissolved in ether, and the ester shaken out with very dilute acid. (3) Magnesium 24·4 is made to react with chlorethyl in pure dry ether, and pure dry quinine 324 is added; when the evolution of ethane ceases, acetyl chloride 78·5, or acetic anhydride 102, are added and the mixture is boiled for two hours. The ester is removed from the reaction product by means of dilute HCl; precipitated with AmOH, and crystallized from petroleum benzin. *Isovalerylquinine*, $C_{20}H_{25}N_2O{\cdot}O{-}O{-}CO{-}C_4H_9$. Quinine alkaloid dried at 125°C., 3, are heated with isovalerylchloride 4, on the water-bath until combined. Or valerianic anhydride or ester, or a mixture of the acid and chloride, may be used. The valerylquinine hydrochloride is dissolved in hot water: when cold, it is precipitated with AmOH and shaken out with C_6H_6. It is an amorphous hygroscopic powder. *a-Bromoisovalerylquinine*, $C_{20}H_{23}N_2O{-}O{\cdot}CO{-}CHBr{-}C_3H_7$. Dry quinine hydrochloride 3, and α-bromoisovaleryl bromide 4, are heated together on the oil bath to 120°C. The excess of bromide is then driven off; the residue is washed free from quinine hydrochloride with hot water, then mixed with 5 per cent. of ammonia. When a granular separation forms this is collected, redissolved in 10 per cent. HCl and reprecipitated with AmOH. Or anhydrous quinia 1·5 and α-bromisovalerylchloride may be treated in a similar manner. The product is a pale yellow amorphous sub-

stance. *Succinylquinine,* $C_{20}H_{23}N_2O$–O–CO–CH_2. Quinine alkaloid 64·8, is heated with phenyl succinate 27, to 130–140°C. It crystallizes in large needles from alcohol, m.p. 97°C. *Benzoyl quinine,* $C_{20}H_{23}N_2O$–O–CO–C_6H_5. Quinine 32·4; and phenyl benzoate 19·8, or cresyl benzoate 21·2, are heated together for several hours at 130–140°C. Or the compound may be prepared by Grignard's Mg. process. *Cinnamyl quinine,* $C_{20}H_{23}N_2O$–O–$COCHCHC_6H_5$. (1) Anhydrous quinia 3·2, suspended in C_6H_6 10, is treated with a solution of cinnamyl chloride 1·7 in C_6H_6. Solution occurs with the heat of reaction and the ester separates. It is washed with C_6H_6 and recrystallized from hot water. It forms tasteless needles, m.p. 235–236°C., sparingly soluble in water. (2) Quinia 32 4, is heated to 120–130°C. with phenyl cinnamate 22·4. It forms fine white needles, m.p. 110°C., sparingly soluble in water. *Salicyl-quinine,* $C_{20}H_{23}N_2O$–O–CO–$C_6H_4O_4$. Quinia 32·4, is heated to 140–150°C. with salol 21·4; for several hours the fused mass is rubbed down with C_6H_6 and the salicyl-quinine shaken out with dilute acid. It is then precipitated with dilute AmOH and crystallized from EtOH in large colourless crystals, m.p. 140°C., insoluble in water. It may also be prepared by melting anhydrous quinine hydrochloride 36·05, or hydrated hydrochloride 39·65, with salol 21·4; or quinine sulphate 20, with salol 50, at 140–150°C. The melted mass is then treated as above. The ester may also be prepared by the interaction of quinia and the salicylides or by the action of salicyl chloride in $CHCl_3$ solution on quinia. *Anisyl quinine,* $C_{20}H_{23}N_2O$–O–CO–C_6H_4–OCH_3. Obtained by heating together at 120–130°C. quinia 32·4, and phenyl anisate 22·4, for several hours. The warm melted mass is treated with C_6H_6 and the free phenol removed with dilute NaOH. The ester is then shaken out with dilute acid. It forms fine white needles, m.p. 87–88°C. *Chlorcarbonyl quinine,* $C_2H_{23}N_2O$·OCOCl. Several methods of preparation are described. It forms delicate needles, m.p. 187–188°, sparingly soluble in water. *Diquinine carbonate; aristochin,* $C_{20}H_{23}N_2O$–O–CO–$OOC_{20}H_{23}N_2$. Two methods of preparing this are detailed. It forms white crystalline crusts, m.p. 189°C., almost insoluble in water, readily soluble in alcohol. It is tasteless, and unaffected by boiling with water, but is easily decomposed by either acids or alkalies. Very stable in the dry state, its salts are easily decomposed in solution, being converted into quinine

salts. Its uses, as a substitute for quinine, are well known. *Quinine-carbonic acid ethyl ester*; *Euquinine*, $C_{20}H_{23}N_2O$–O–COO–C_2H_5. Several methods of preparing this are given. It forms delicate white needles, m.p. 95°C., sparingly soluble in water, readily dissolved in alcohol. Is claimed to be less likely to produce secondary symptoms than quinine. A number ot other quinine carbonic acid esters are also described. *Para-ethoxyphenyl carbaminic acid quinine ester*; *Quinaphenine*, $C_{20}H_{23}N_2O$–O–CO–NH–$C_6H_4OC_2H_5$. The method of preparation is described. It forms a white, almost tasteless powder, and has been prescribed as a general quinine substitute and as a remedy for whooping-cough. *Iodoquinine*, $C_{20}H_{23}N_2O_2I$. A solution of quinine hydrochloride 50, in water 2,000, is treated, at 40 to 50°C., with iodine 15 dissolved in HCl, 30, added drop by drop. When the mixture becomes colourless, the iodoquinine is precipitated by AmOH. The iodizing may also be conducted with alcoholic solutions. The base melts at 80° to 90°C., or when dried at 50° to 100°C., at 110°C. *Quinine iodohydroiodide*, *sulphide* and *oxyhydroquinine* are also described, and the methods of preparation are given. The methods of preparing the following compounds of other cinchona alkaloids, and the properties of the products are given. *Salicyl-quinidine*, *cinchonine-guaiacolsulphonate*, *cinchonine para-amido phenylarsenate*, *cinchonine-saccharin*, *iodocinchonine*, *cinchonidine bismuth double salt*, prescribed under the name of *erythrol* for dyspepsia; *salicyl cinchonidine*, *chlorcarbonyl-cinchonidine*, *dicinchonidine dicarbonate*, *cinchonidine carbonic-acid-ethyl-ester*, *cinchonidine carbonic acid phenyl ester*; and *cinchonidine carbonic acid phenetidine*.

Cinchona Alkaloids, Varying Fluorescence of. G. Denigès. (*Bull. Soc. Pharm. Bord.*; *Rép. Pharm.*, 1909, **21**, 486.) If 0·02 Gm. of quinine, cupreine, cinchonine, and cinchonidine be dissolved separately in 2 c.c. of glacial acëtic acid, and 2 c.c. of H_2SO_4 be added to each, a slight fluorescence is observable in each case. On adding 0·2 c.c. of formaldehyde solution, the cupreine and quinine solutions show a strong bluish-green fluorescence; with cinchonine, the shade is decidedly bluer; and with cinchonidine, it is bluish-violet. On adding 3 or 4 c.c. of water to each mixture, the fluorescence of the quinine, cinchonidine, and cinchonine solutions persists, but it disappears in the cupreine solution; and in the quinine solution, the green

shade tends to be accentuated. On further dilution with water, the fluorescence of the cinchonidine solution rapidly diminishes, and is barely visible in 10 to 15 c.c.; while it is quite evident in 40 or 50 c.c. of the quinine solution, and is stronger still in that of cinchonine.

Cinchona Bark, Alkaloidal Assay of. H. Engelhardt and H. W. Jones. (*Amer. Drugg.*, 1910, **56**, 5.) The authors suggest the following modification of the Keller-Fromme method with the additional titration of the alkaloids by a modification of Panchaud's process. 2·5 Gm. of bark, in moderately coarse powder, is heated in a 200 c.c. flask with 2 c.c. of 25 per cent. HCl and 20 c.c. of distilled water, for ten minutes on a steam bath. The mixture is then allowed to cool, and 50 Gm. of Et_2O and 25 Gm. of $CHCl_3$ are added. After shaking well the mixture is supersaturated with 5 c.c. of KOH solution (15 per cent.), and then shaken again continuously for 15 minutes. After the addition of 1·5 Gm. of gum tragacanth the mixture is shaken again, and after the liquids have separated, 60 Gm., equal to 2 Gm. of the bark, is filtered and transferred to a separator. The ethereal solution is then shaken out three times with 1 per cent. HCl, using 20, 10, and 10 c.c. respectively. The acid solutions are combined in another separator, shaken well with 15 c.c. of $CHCl_3$, and then supersaturated with AmOH and shaken well. After settling, the $CHCl_3$ is filtered through a double filter into a carefully tared 100 c.c. Erlenmeyer flask, the aqueous solution shaken out twice more, using 10 c.c. of $CHCl_3$ each time; this $CHCl_3$ is filtered and added to the $CHCl_3$ already in the flask. The solvent is then evaporated off and the residue dried at 100°C. It is then dissolved in 10 c.c. of EtOH and 10 c.c. of Et_2O. To this solution 30 c.c. of water is added, and after the addition of a few drops of hæmatoxylin solution, N/10 acid is gradually added with constant shaking until the purple colour has almost changed to yellow. Then 10 c.c. of water and more acid are added until the liquid has acquired a lemon-yellow colour. Thirty c.c. of water is then added, and after vigorous shaking, more acid, until the lemon-yellow colour persists. Each c.c. of N/10 corresponds to 0·0309 Gm. of total alkaloids. (See also *Y.B.*, **1904,** 124; **1905,** 137, 471; **1906,** 23; **1908,** 51; **1909,** 72, 73.)

Coca Alkaloids, their Salts and Compounds, Preparation of. G. Cohn. (*Pharm. Zentralh.*, 1910, **51,** 364.) *Cocaine and*

allied alkaloids. The leaves are moistened with 20 per cent. Na_2CO_3 solution and extracted with Et_2O. The Et_2O extract is shaken with dilute HCl; the bases are liberated from the acid solution with Na_2CO_3, and dissolved in a little hot alcohol. On cooling, the greater part of the cocaine crystallizes out, and the other alkaloids are recovered from the mother solutions. The total alkaloids may also be isolated by precipitation as zinc rhodanate double-salts. The neutral solution of bases is treated with a solution of Zn2CNS or a mixture of $ZnSO_4$ and NaCNS. The coca bases are precipitated and reliberated from the separated precipitate with soda; and removed from the dry precipitate of bases and $ZnCO_3$ with C_6H_6 or Et_2O. *Ecgonine.* $C_9H_{15}NO_3 + H_2O$. The allied alkaloids are heated for one to two hours with an excess of HCl, filtered after cooling, to remove the separated organic acids, and evaporated to dryness. The residue, washed with warm water, is almost pure ecgonine hydrochloride. The base is liberated from this by alkali or alkali carbonate, and, if necessary, crystallized from alcohol. *Benzoyl-ecgonine*, $C_{16}H_{19}NO_4 + 4H_2O$. Hot saturated aqueous solution of ecgonine, about 2 parts in 1, is treated with a little more than the theoretical quantity of benzoic anhydride and boiled for half an hour. Benzoic acid is shaken out with Et_2O, and the aqueous liquid, on standing, separates a crystalline mass. The mother liquor yields a further quantity on again benzoylizing. *Cocaine*, $C_{17}H_{21}NO_4$, is obtained by methylating the above benzoyl ecgonine in the usual manner. *Ecgonine-methyl-ester*, $C_{10}H_{17}N_3$. Ecgonine hydrochloride is dissolved in anhydrous methyl alcohol and the solution is saturated with HCl gas. On adding Et_2O to the cooled liquid the hydrochloride of the ester crystallizes out. The allied alkaloids or their hydrochlorides when boiled with methyl alcohol and acid are converted into methyl esters; and the esters of the organic acids are simultaneously formed; these latter are removed by shaking out with Et_2O or $CHCl_3$. The aqueous liquid is then treated with just sufficient K_2CO_3 to give an alkaline reaction; a whitish precipitate and a resinoid substance separate and are filtered out. An excess of K_2CO_3 is then added, and the ecgonine methyl ester is shaken out with $CHCl_3$. *Cocaine* is obtained by benzoylating the above ecgonine methyl ester hydrochloride by heating it on the water-bath with benzoyl chloride until HCl is no longer evolved. The cocaine hydrochloride is dissolved out with water, and the base liberated with Na_2CO_3.

Cocaine ethylene, Homococaine, $C_{18}H_{23}NO_4$. The ethyl ester of ecgonine is benzoylized as above. Methods for the preparation of the following esters, salts and bases are also given :—*ortho-phthalyl diecgonine methyl ester*, $C_{28}H_{36}N_2O_8$; *iso-valerylecgonine methyl ester*, $C_{15}H_{25}NO_4$; *phenyl-acetyl-ecgonine methyl ester*, $C_{18}H_{23}NO_4$; *dextro-ecgonine hydrochloride*, $C_9H_{15}NO_3 \cdot HCl$; *dextro-ecgonine methyl ester*, $C_{10}H_{17}NO_3$; *dextro-cocaine*, $C_{17}H_{21}NO_4$, and many others. Among the salts and double salts of cocaine treated of are : *Cocaine hydro-iodide*, $C_{17}H_{21}NO_4HI$. White crystals slightly soluble in water : employed in electro-anaesthesia, without puncturing; anaesthesia being induced by passing an electric current; the salt is usually applied in combination with guaiacol. *Cocaine nitrite*, $C_{17}H_{21}NO_4HNO_2$. Pale yellow crystals readily soluble in water. Best handled commercially in solution, as the crystals are unstable. Used as a spray for asthma. *Cocaine lactate*, $C_{17}H_{21}NO_4 \cdot C_3H_6O_3$. A yellowish crystalline honey-like mass. Readily soluble in water and alcohol. Employed as a dental anaesthetic. *Cocaine stearate*, $C_{17}H_{21}NO_4C_{18}H_{36}O_2$. Colourless leaflets, readily soluble in alcohol, fats and vaseline. Decomposed on melting. *Cocaine arabinate*. Pure arabinic acid, free from ash, is mixed in aqueous solution with an alcoholic solution of cocaine alkaloid, and the mixture is evaporated to dryness. The powdered product is treated with ether to remove any free base. The salt is more suitable for producing lumbar anæsthesia than the hydrochloride. *Cocaine aluminium citrate*. Neutral aluminium citrate 2, is rubbed down with cocaine alkaloid, 1, and a little water. The mixture becomes almost clear, thick, and viscous. It is then dried at 60°C., powdered, and freed from uncombined cocaine by treatment with ether, and then from excess of aluminium citrate by means of a little cold water. The dried product is a faintly bitter, astringent anæsthetic powder. Cocaine iodo-methylate, chlormethylate and bromomethylate are also described, and some of the oxidation and reduction products of benzoylecgonine and ecgonine.

Codeine, Determination of in Syrup of Codeine. (*J. Pharm. Chim.*, 1909, **30**, 492.) Twenty-five Gms. of the syrup are diluted with an equal weight of water, and the solution is made distinctly alkaline by the addition of anhydrous K_2CO_3. The liquid is then shaken with three successive portions each of 40 c.c. of $CHCl_3$: the mixed $CHCl_3$ extracts are filtered, and

the solvent is distilled off on a water-bath. The residue is dissolved in a small quantity of EtOH, the solution transferred to a tared capsule, the EtOH evaporated off, and the residue of anhydrous codeine dried at 100°C. and weighed. This weight $\times$ 1·060 gives the equivalent of the crystalline alkaloid.

Colchicum Corm and Seed, Impurity of the "Colchicine" of the U.S.P. Assay Process for. A. R. L. Dohme, H. Engelhardt, and R. Schmidt. (*Drugg. Circ.*, 1910, **54**, 58.) In preparing colchicine on a large scale by a method similar to the assay process of the U.S.P., 1900, the yields obtained have been below those indicated by analysis of samples, employing the official process. By this, eight samples of colchicum corms yielded from 0 352 to 0 434 per cent. of "colchicine," and nine samples of seeds from 0 480 to 0 796 per cent. This "colchicine" was then purified by Panchaud's method (*Y.B.*, **1907,** 35). Applying this method to the "colchicine" residue obtained by the official U.S.P. process, that from the corms was found to be only from 35 2 to 48 4 per cent. pure; and that from the seeds from 58 1 to 75 8 per cent. pure. (See also *Y.B.*, **1904,** 67; **1907,** 35; **1909,** 27, 105.)

Corydalis aurea, Crystalline Alkaloid from. G. Heyl (*Apoth. Zeit.*, 1910, **25,** 137.) The rhizomes, stems, and leaves of *Corydalis aurea* were extracted with alcohol 80 per cent., acidified with acetic acid; the acid extract, treated with AmOH, was shaken out with Et_2O. On evaporating the solvent a crystalline residue was obtained. On neutralizing the alcoholic solution of this with HBr, a crystalline hydrobromide resulted, from which the base was liberated by AmOH. It crystallizes from dilute EtOH in shining white leaflets; m.p. 148–149°C. Precipitated by the usual alkaloidal reagents. It gives colourless solutions with H_2SO_4 and with Erdmann's reagent. With HNO_3 the solution, at first colourless, ultimately becomes yellowish-red. With Froehde's reagent, the olive-green colour shows a bluish tint round the edges; with Mandelin's reagent, the colour given is olive to brownish-green.

Corydalis solida, Alkaloids of. G. Heyl. (*Apoth. Zeit.*, 1910, **25,** 36.) O. Haars (*Y.B.*, **1905,** 69), has previously isolated bulbocapnine from the herbaceous portion of the plant. The tubers do not appear to have been examined previously, are

now shown to contain protopine, also two other alkaloids, one melting at 145°C. and the other at 132°–133°C.

Ergot, a new Alkaloid from, Ergothioneine. C. Tanret. (*Pharm. Chim.*, 1909, **30,** 145.) A new base, ergothioneine, $C_9H_{15}N_3O_2S,2H_2O$, crystallizing from water in clinorhombic lamellae, m.pt. about 290°C., with subsequent decomposition, has been isolated from the alcoholic extract of ergot. Ergothioneine is soluble to the extent of 1 : 8 6 of water at 20°C.; very soluble in hot water; sparingly dissolved by strong EtOH; 1 : 30 in 60 per cent. alcohol at 20°C. and 1 : 6 or 1 : 7 in the same at boiling point; less soluble in stronger spirit; very sparingly soluble in MeOH, and in acetone; insoluble in Et_2O, $CHCl_3$, and benzine. The aqueous solutions have the $[\alpha]_D = + 110°$. It is not volatile. When freshly prepared, it is odourless; but develops an unpleasant odour on keeping. It was isolated by extracting the drug with 90 per cent. EtOH, distilling off the solvent, and removing fats and resins from the residue by filtration. The latter was freed from colouring substances and more or less altered ergotinine by precipitation with 20 per cent. H_2SO_4; after removing excess of this with $Ba(OH)_2$, the filtrate was treated with basic lead acetate solution. The filtrate from this was treated with H_2SO_4 to remove the excess of lead, rendered alkaline, and shaken out with $CHCl_3$ to remove other bases. The separated aqueous portion was acidified with acetic acid and the ergothioneine precipitated as $HgCl_2$ compound by means of an 8 per cent. solution of $HgCl_2$ added until the precipitate at first formed, then redissolved and finally re-precipitated, ceased to increase further in volume. The $HgCl_2$ compound was decomposed with H_2S, and the aqueous solution of ergothioneine hydrochloride evaporated under reduced pressure to a syrup. On cooling, the salt crystallized out. The yield was about 1 : 1,000. The free base was obtained by treating the aqueons solution of this hydrochloride with $CaCO_3$. As thus obtained it was contaminated with traces of $CaCl_2$, which caused it to crystallize in an acicular form. It was purified by recrystallization from boiling 60 per cent. alcohol. Ergothioneine is a very feeble base; it does not react with litmus; but its salts are generally crystalline. The acids in these behave towards indicators as if they were free. Ergothioneine salts are precipitated by potassium-mercuric iodide, by $HgCl_2$, and by a solution of I in KI; but not by picric acid, nor by tannin;

nor by sodium silicotungstate, except from very strong solutions. The free base is removed from very strong aqueous solution by tannin. When fused with alkali, then treated with acid, H_2S is evolved. When the solution of the alkaloid is heated with $CHCl_3$ and KOH, a green colour is formed, changing to blue on neutralization. The *hydrochloride*, $C_9H_{15}N_3O_2S,HCl+2H_2O$, forms fine orthorhombic crystals; stable when preserved from air. Although its hydrochloric acid reacts as if free, its solutions may be evaporated to dryness at 100° C. without loss of acid. Since it forms a definite silver compound $(AgCl)_2\ [(C_9H_{15}N_3O_2S)_2\ Ag_2O]$, with silver nitrate, the amount of chlorine present cannot be determined directly, but must be found by the soda-lime method. The *phosphate*, $C_9H_{15}N_3O_2S{\cdot}H_3PO_4$, forms anhydrous needles. The *sulphate* $(C_9H_{15}N_3O_2S)_2{\cdot}H_2SO_4+2H_2O$ is soluble 1 : 7 in water at 10°C. The *hydroiodide*, $(C_9H_{15}N_3O_2S)_2HI+2H_2O$ forms fine orthorhombic crystals. The *mercuri-chloride*, $HgCl_2(C_9H_{15}N_3O_2S{\cdot}HCl)$, after first redissolving, is precipitated in needles. The *platino-chloride* is amorphous. (See also *Y.B.*, **1907,** 60, 62 ; **1909,** 333.)

Ergot Alkaloids, Further Investigation of. G. Barger and A. J. Ewins. (*Trans. Chem. Soc.*, 1910, **97,** 284.) Ergotoxine (the amorphous ergotine of Tanret, the cornutine of Kobert and the hydro-ergotinine of Kraft), $C_{35}H_{41}N_5O_6$, only differs from ergotinine $C_{35}H_{39}N_5O_5$ by 1 mol. H_2O. Kraft had already recognized this connection, for he named the amorphous base hydro-ergotinine, and had converted it into ergotinine by boiling the methyl alcohol solution. When an alcoholic solution of ergotinine is heated with H_3PO_4 a crystalline phosphate is obtained, resembling the phosphate of ergotoxine, but differing in crystalline form; separating in flat hexagons or triangles, whereas ergotoxine phosphate forms small needles. This is supposed to be the phosphatic ester of an alcohol which results by the formation of an acid from ergotinine, which is the lactone or lactame of ergotoxine. On boiling with alcohol this lactone function is broken down and an acid formed. This forms an ester with the alcohol, and yields a crystalline phosphate. The acid function of ergotoxine is also shown by its solubility in alkalies, while ergotinine and the ethyl ester of ergotoxine, having no acid function, are insoluble. The property of ergotoxine of forming esters with alcohol explains certain previously observed anomalies. The yield of ergotinine from ergotoxine

obtained by boiling the methyl alcohol solutions of the latter is by no means quantitative. A certain amount of the methyl ester of ergotoxine is also formed. When ergotonine is recrystallized from alcohol, the yield is always markedly below the theoretical quantity, since a portion of the ergotinine is transformed into the ethyl ester of ergotoxine. The same cause explains the observed alteration in the optical activity of alcoholic solutions of ergotinine, which is very marked after boiling, due to the formation of the same ester. When either ergotinine or ergotoxine are slowly heated to decomposition in a sealed tube, a small amount of a crystalline sublimate, identified as isobutyl formamide, is formed; it is probable that this amide exists, as such, in the molecule. No evidence of phenolic properties nor of the existence of a methoxyl group in ergotinine were obtained. One of the five atoms of nitrogen is probably attached to a methyl group; at least one is tertiary; it is remarkable that the two bases are but feebly monoacid, seeing that they contain five atoms of N.

Ergot Extracts: A Third Active Principle in. G. Barger and H. H. Dale. (*Chem. Proc. Soc.*, 1910, **30,** 128.) In addition to the active principles previously described by the authors as present in ergot and its extracts, namely, ergotoxine and *p*-hydroxyphenylethylamine (*Y.B.*, **1907,** 60; **1909,** 333), a third active principle has now been isolated. The relative abundance of this principle in dialyzed extracts suggested that it was wholly or partly produced by micro-organisms, and this supposition was confirmed by physiological experiment. It was also found that commercial extracts of meat and of yeast have a similar activity in smaller degree. Applying Kutscher's method for separating bases from meat-extract, the authors obtained the active principle from dialyzed "ergotine" as a silver compound by adding $AgNO_3$ in excess and then BaO. The hydrochloride of the physiologically active base obtained from this silver precipitate is readily soluble in cold MeOH, less so in hot EtOH, and very sparingly so in cold EtOH. After suitable purification, a minute quantity of a crystalline picrate, melting at 220°–230°, and a picrolonate, very sparingly soluble in boiling water and melting at about 250° C., were obtained. The base regenerated from either salt gave Pauly's reaction with *p*-diazobenzenesulphonic acid. It is considered to be *β*-iminazolylethylamine, produced from histidine by loss of

carbon dioxide in the same way that *p*-hydroxyphenylethylamine in ergot extracts is produced from tyrosine. This provisional identification is supported by the facts that (1) the properties of the hydrochloride, picrate, and picrolonate above described correspond closely with those of the salts of β-iminazolylethylamine synthesized by Windaus and Vogt, and quite recently obtained by Ackermann by the putrefaction of histidine, and (2) the authors' base and that prepared by Ackermann exhibit the same physiological action.

Eserine, Intensely Fluorescent Substance from. P. Gaubert. (*Comptes rend.*, 1909, **149,** 852.) A compound showing the most intense fluorescence of any substance yet known has been obtained by adding hydrated phthalic acid to solutions of eserine which had kept for some months until they had acquired a deep blue colour. The new body forms dark blue crystals: the aqueous solution of which, when diluted so as to be almost colourless by transmitted light, shows a bright ruby red colour when viewed by reflected light. Alcohol and ether coloured with this substance do not show any fluorescence; nor does silk, nor other solids.

Gelsemium sempervirens, Continuation of Investigation of Alkaloids of. L. E. Sayre. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 902.) The previous results (*Y.B.*, **1909,** 37) have been carried a step further. Gelsemium root, first extracted with gasolene, then with EtOH 95 per cent., gave 9·75 per cent. of soft extract when evaporated *in vacuo*. In two months, this extract had separated crystals of nearly pure sugar. A portion of the extract, acidified with H_2SO_4, yielded gelsemic acid when shaken out with $CHCl_3$. Another portion of the extract, made alkaline with AmOH, was shaken out with C_6H_6. The C_6H_6 solution was filtered and shaken out with 2 per cent. H_2SO_4. This acid solution was freed from gelsemic acid by shaking out with $CHCl_3$, then made alkaline with AmOH, and the liberated alkaloid was shaken out with $Et_2O-CHCl_3$ mixture. This was in turn shaken out with dilute HCl, the acid liquid evaporated *in vacuo*, and crystallized. The resulting gelsemine hydrochloride crystals after washing with EtOH, were dried *in vacuo*. Two other methods of extraction yielded the hydrochloride in an amorphous state. The investigation is being continued.

Hordenine, Synthesis of. G. Barger. (*Proc. Chem. Soc.*,

1909, **25,** 289.) Hordenine, isolated by Léger from malt culms, and recognized by him as *p*-hydroxyphenylethyldimethylamine, $OH{\cdot}C_6H_4{\cdot}CH_2{\cdot}CH_2{\cdot}NMe_2$, has now been synthesized from phenylethyl alcohol, which was successively converted into *β*-phenylethyl chloride and phenylethyldimethylamine: the phenolic hydroxyl was then introduced by successive nitration, reduction, and diazotization.

The more obvious synthesis, by methylation of *p*-hydroxyphenylethylamine, could not be carried out; by this means only hordenine methiodide was obtainable, but not hordenine itself. (See also *Y.B.*, **1906,** 41; **1907,** 79; **1909,** 41, 42.)

Hydrastine, Determination of, in Liquid Extract of Hydrastis. E. Rupp. (*Apoth. Zeit.*, 1909, **24,** 922.) Ten Gm. of the fluid extract is weighed off in a 125 c.c. tared Elenmeyer flask; 20 Gm. of water is added, and the mixture is gently boiled until all the EtOH has been driven off and the residue weighs 9–11 Gm. After cooling, 1·5 Gm. of dilute HCl is added and the total weight is adjusted to 20 Gm. by adding more water: 1 Gm. of talc is introduced, and after shaking up thoroughly for a minute, the mixture is thrown on a plain filter. Ten Gm. of filtrate is collected in a tared 100 c.c. flask; 4 Gm. of AmOH solution (10 per cent.) is added, and 20 Gm. of Et_2O. The mixture is again agitated for a minute, then 20 Gm. of petroleum ether is run in, the shaking being repeated: 1·5 Gm. of powdered tragacanth is introduced, and the whole is agitated until the gum aggregates. Thirty-two Gm. of the clear ethereal solution is then decanted into a tared glass evaporating cylinder; the solvent is carefully evaporated, and the residue dried to constancy is weighed as hydrastine. This weight × 25 gives the percentage. (See also *Y.B.*, **1905,** 399; **1907,** 11, 12, 79; **1908,** 93.)

Hydrastis Alkaloids, Salts and Substitution Products of. G. Cohn. (*Pharm. Zentralh.*, 1910, **51,** 398.) The berberine accompanying alkaloids of hydrastis approach the alkaloids of the opium group both in chemical constitution and in physiological action. On oxidation narcotine yields cotarnine and opianic acid; hydrastine gives the same acid and hydrastinine. The latter resembles narcotine in its molecular constitution, but contains a CH_2 group less. Therapeutically, the removal of opianic acid from the molecule increases its value. ***Hydrastinine,*** $C_{11}H_{13}NO_3$, is obtained by oxidizing hydrastine with

HNO_3 or by other methods. When liberated by alkali, and crystallized from petroleum ether, it forms needles, m.p. 116–117°C. The hydrochloride melts at 212°C. *Methylhydrastamide*, $C_{22}H_{26}N_2O_6$, and other compounds of the series are described. *Methylhydrastimide* (Amenyl) is obtained by boiling methylhydrastamide with a large excess of 33 per cent. KOH or NaOH solution, until a thick yellow oil is formed, which is crystallized from EtOH 96 per cent. It forms fine yellow needles, m.p. 192°C., insoluble in water. It is prescribed for amenorrhoea.

Berberine substitution products are also described. These have at present no practical interest.

Ignatius Beans, Alkaloidal Value of. (*Evans' Analyt. Notes*, **1909,** 35.) Commercial beans were found to yield 2·14 per cent. of total alkaloid, of which 0·82 per cent. was brucine.

Jaborandi (Pilocarpus microphyllus) Leaves and Stalks, Alkaloidal Value of. (*Evans' Analyt. Notes*, **1909**, 35.) The highest yield of alkaloid obtained from the drug was 0·8 per cent. Stalks separated from leaves gave 0 47 to 0 55 per cent. of alkaloid. (See also *Y.B.*, **1905,** 199; **1906,** 102; **1907,** 12.)

Laurelia Novae-Zealandiae, Alkaloids of. B. C. Aston. (*Proc. Chem. Soc.*, 1910, **26,** 11.) *Laurelia novae zealandiae* ("pukatea") contains three alkaloids: Pukateine, $C_{17}H_{17}O_3N$, crystalline, m.p. 200°C.; $[a]_D -220°$; laureline, $C_{19}H_{21}O_3N$, amorphous but forming crystalline salts; and laurepakine, $C_{16}H_{18}O_3N$, amorphous. Pukateine hydrochloride resembles strychnine in its physiological action, but is not so powerful.

Lunaria biennis, Alkaloid of the Seeds of. E. Hairs. (*Chem. Zentralb.*, 1910, **1,** 456.) The seeds of the Cruciferous garden "honesty," *Lunaria biennis* were freed from fat by extraction with petroleum ether, and extracted with boiling EtOH. From the extract, about 1 per cent. of a crystalline alkaloid was isolated in white needles, m.p. about 220°C. It is almost insoluble in water, but easily soluble in acids and in chloroform.

Menispermum canadense, Alkaloids of. H. M. Gordin. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 891.) A preliminary examination shows that the alkaloids of the root of the yellow parilla are probably present in the form of salts, since Et_2O fails to remove them. Using Prollius's fluid as the extracting medium, and $CHCl_3$ for the final shaking out, 3 per cent. of

crude dark coloured bases were obtained. Of this 1·2 per cent. is soluble in Et_2O, the rest insoluble in that solvent, but soluble in $CHCl_3$. Both are soluble with difficulty in water, soluble in excess of AmOH, and easily soluble in KOH solution. This explains the small yield obtained by previous investigators, using alkali instead of alkali carbonates as precipitants. Et_2O does not remove the bases from acid solutions. Cold alcohol extracts 50 per cent. of the total alkaloids, and hot alcohol 80 per cent. The investigation is proceeding.

Mucuna capitata Seeds, Constituents of. Von den Driessen Marceeuw. (*Pharm. Weekbl.*, **1909,** 881 ; *Apoth. Zeit.*, 1909, **24,** 886.) The seeds contain an alkaloid, tannin and a fat, the characters of which are given. It is a mixture of glycerides of palmitic, stearic and probably oleic acids.

Mydriatic Solanaceous Alkaloids, Official Methods for Determining. B. Wiki. (*Bull. Sci. Pharm.*, 1909, **16**, 640.) The official methods of the Ph. G. IV and the French Codex, **1908,** which are virtually identical, are less satisfactory than those of the Pharm. Helvet. IV or of Merck (*Y.B.*, **1901,** 40). The details of the Swiss method are as follows for the extract of belladonna. Three Gm. of extract is dissolved in 5 c.c. of water: Et_2O 90 Gm. is added, and after agitation, AmOH 1: 10, 1 Gm. After frequent agitation for 15 minutes; the mixture is set aside for another 15 minutes. Sixty Gm. of the Et_2O extract is then weighed off (=2 Gm. of original extract), and evaporated on the water-bath. The residue is taken up with 5 c.c. of Et_2O and again evaporated to dryness; the process is repeated twice more in succession. The thrice evaporated residue is then redissolved in absolute alcohol, treated with ether and water, and titrated with N/100 HCl, with haematoxylin indication. It is suggested that the use of iodeosin as the indicator is an improvement, giving sharper readings. It is to be regretted that no official process for the alkaloidal valuation of belladonna leaves or their extract finds a place in the French Codex.

Nauclea excelsa Leaves, Alkaloidal and Other Constituents of. (*Gehe's Reports*, **1910** ; *Apoth. Zeit.*, 1910, **25,** 272.) The leaves of *Nauclea* (*Uncaria*) *excelsa* are reputed to be a remedy against the opium habit. An infusion of these is said to produce aversion to the drug in confirmed opium smokers. The leaves yield a

small amount of volatile oil, which becomes crystalline on standing. A snow white crystalline alkaloid, *naucleine*, $C_{21}H_{26}N_2O_4$, m.p. 264°C., with decomposition, is also present. The shining needles of this are readily dissolved in $CHCl_3$; less soluble in EtOH, Et_2O, and in acetic ether; insoluble in water. Its Pt salt, in small octohedra, melts at 250°C. with decomposition.

Neuralteine, Pyramidon, and Antipyrine, Distinctive Tests for. A. Monferrino. (*Pharm. Zentralh.*, 1910, **51**, 334.) *Neuralteine* solutions give a violet colour with Fe_2Cl_6, which changes to green on adding H_2SO_4, finally becoming blue. A 1 : 100 solution gives a reddish yellow colour with H_2SO_4 and strong HNO_3. $SnCl_2$ solution gives a white precipitate. A 1 : 100 solution is coloured reddish yellow on adding a drop of 5 : 100 solution of KNO_2 and a drop of H_2SO_4 or $HC_2H_3O_2$. *Pyramidon:* A solution is coloured violet with Fe_2Cl_6, which is changed to blue on adding H_2SO_4. *Antipyrine:* The aqueous solution is coloured red by Fe_2Cl_6. On adding H_2SO_4 this is changed to chrome yellow. Acid and KNO_2 give no reaction.

Nicotine in Cigar Smoke. Heubel and Kissling. (*Pharm. Zentralh.*, 1910, **51**, 93; *Chem. Zeit.*, **1909**, 866.) The debated question as to the condition, free or combined, of nicotine in cigar smoke has been solved by the authors, who find that 93 per cent. of the total alkaloids exist in the smoke in the free state. The smoke of 300 cigars, aspirated through a series of Woulff's bottles, yielded 8 786 Gm. of free bases calculated as nicotine, and only 0 661 Gm. combined with organic acids.

Novocaine, Para-amidbenzoyldiethylaminoethanol hydrochloride, Suggested Characters and Tests for, in the new Ph. G. V. (*Apoth. Zeit.*, 1910, **25**, 157.) $NH_2\cdot C_6H_4\cdot COOC_2H_4N(C_2H_5)_2\cdot HCl$. Colourless and odourless small needles, slightly bitter in taste and producing insensibility on the tongue. Soluble 1 : 1 in water; 1 : 30 in alcohol 90 per cent. The 1 : 10 aqueous solution is neutral. M.p. 156°C. KOH throws out an oily precipitate from a 1 : 10 solution, which soon forms crystals. Equal parts of the salt and HgCl blacken when mixed and moistened with dilute alcohol 68 per cent. A solution of 0·1 Gm. of the salt in 5 c.c. of water, with 2 drops of HCl and 2 drops of $NaNO_2$ solution, gives a scarlet precipitate when treated with 0·2 Gm. of β-naphthol dissolved in 1 c.c. of NaOH.

A solution of 0·1 Gm. of the salt in 5 c.c. of water, 3 drops of dilute H_2SO_4, should immediately destroy the colour of 5 drops of $KMnO_4$, solution (distinction from cocaine). 0·1 Gm. of the salt should give colourless solutions with 1 c.c. of H_2SO_4, and also with 1 c.c. of HNO_3 (absence of foreign organic matter). The 1 : 10 aqueous solution should not be affected by H_2S. The salt, when incinerated, should leave not more than 0·1 per cent. of ash.

Nupharine. A. Goris and L. Crété. (*Bull. Sci. Pharm.*, 1910, **17**, 13.) The amorphous alkaloid of the rhizomes of *Nuphar luteum* was first described by Gruening (*Y.B.*, **1884**, 215), who attributed to it the formula $C_{18}H_{24}N_2O_2$. The authors have extracted it by means of water acidified with HCl; precipitating the base with silicotunstic acid (*Y.B.*, **1909**, 63). From this it was liberated by treatment with $Ba(OH)_2$. It was noticed that when the base was left in contact with the $Ba(OH)_2$ that an odorous aldehyde, identified as cinnamic aldehyde, was formed. After removing this a crystalline alkaloid having feeble basic properties was isolated, but not quite pure. The investigation is proceeding, and the separation of crystalline nupharine is being attempted.

Nux Vomica Seeds, Alkaloidal Standard for, and Method of Determination of Alkaloids of, in the German Pharmacopœia. G. Weigel. (*Pharm. Zentralh.*, 1909, **50**, 783-784.) The minimum standard of 2·5 per cent. of total alkaloids, prescribed by the Ph. G. IV., is not attained by the undried commercial drug. By the Kelle-Fromme method of determination, the percentage of alkaloids ranges from 2·1 to 2·25. Since nux vomica seeds lose, as a rule, about 10 per cent. of moisture on drying, the dried drug would pass the official standard by this method. The method of determination given in the Ph. G. IV. is, moreover, incorrect, affording too high results, since a portion of the soap formed by the action of the alkali on the fat present in the seeds is weighed as alkaloid. It is suggested, therefore, that the Keller-Fromme method should be made official; and that the minimum content of alkaloids for the natural drug should be 2 per cent., which is the standard adopted by the French Codex, 1908. (See also *Y.B.*, **1904**, 123; **1905**, 364, 470; **1906**, 230, 232, 237; **1907**, 11; **1908**, 496.)

Opium, Galenical Preparations of; Amount of Morphine,

Narcotine and Codeine in. M. van der Kreke and F. Swart. (*Pharm. Weekbl.*, 1909 [48]; *Apoth. Zeit.*, 1909, **24**, 973.) In order to obtain comparable results from uniform material, the following preparations were made from powdered opium, dried at 105°C. The morphine was determined by the official method of the Ph. Batav., except in the case of *Tinct. Opii crocata,* in which case the Na_2CO_3 was omitted. The narcotine was determined by the following modification of van Wielen's method [*Y.B.*, **1903,** 121]. The opium is heated on the water-bath for several hours, with ten times its weight of EtOH, 70 per cent., under a reflux condenser. After cooling, the original weight is made up by adding more solvent, and 30 Gm. of the filtrate is evaporated to a syrupy residue. This is redissolved in a little water; and shaken up with 120 Gm. of Et_2O; 10 c.c. of 1 : 10 Na_2CO_3 solution is then added, and the mixture frequently shaken during three hours' standing. Tragacanth powder, 3 Gm., is then added, and after standing 24 hours, the decanted ethereal solution is distilled and the residue dissolved in 3 Gm. of EtOH 90 per cent. After standing 20 hours the narcotine separates out; it is then collected, washed with 5 c.c. of EtOH 90 per cent., dried, first in the air, and finally at 100°C., and then weighed. The codine was determined by van Wielen's method (*loc. cit.*).

The *opium* contained: Water, 4 84; morphine, 14 7; narcotine, 3·83; codeine, 0·75 per cent. *Extract opii*, prepared on the water-bath: Morphine, 26 4; narcotine, 3·16; codeine, 1 32 per cent.; extract prepared *in vacuo* contained 27 67 per cent. of morphine. *Tinct. opii*; Morphine, 1 36; narcotine, 0·34; codeine, 0·03 per cent. *Tinct. opii crocata:* Morphine, 1 61; narcotine, 0 41; codeine, 0 06 per cent.

Opium Alkaloids, Certain Salts and Derivatives of. G. Cohn (*Pharm. Zentralh.*, 1910, **51**, 316, 335.) *Morphine stearate.* $C_{17}H_{19}NO_3{\cdot}C_{17}H_{35}COOH$. Obtained by precipitating morphine hydrochloride with sodium stearate. White shining scales, m.p., 85°C.; insoluble in water, soluble in oil of sweet almonds. *Morphine saccharinate,* $C_{17}H_{19}NO_3{\cdot}C_7H_5SO_3N$. Prepared like quinine saccharinate (p. 12). Other salts of organic acids are similarly prepared. *Codeine,* $C_{18}H_{21}NO_3+H_2O$. Obtained synthetically by methylating morphine or sodium morphine, for which several alternative processes are given. In rhombic crystals, m.p. 155°C., when anhydrous; or in white octohedra,

m.p. 152°, when hydrated with 1 mol. H_2O. Soluble in water 1 : 120. It is less powerful than morphine as a hypnotic, but has no secondary action on the kidneys. The *hydrochloride*, $C_{18}H_{21}NO_3{\cdot}HCl+2H_2O$, white, bitter needles; soluble 1 : 26 in cold water. The *hydrobromide*, in yellowish crystals, soluble 1 : 60 of water; prescribed in catarrhs. The *sulphate*, $(C_{18}H_{21}NO_3)_2H_2SO_4+5H_2O$, in long white aggregated needles, soluble 1 : 4 of water; prescribed for children and delicate patients. The *hydroiodate*, $C_{18}H_{21}NO_3{\cdot}HIO_3$, in needles, is an active anti-neuralgic and analgesic when administered hypodermically, but decomposes on keeping. The *salicylate*. $C_{18}H_{21}NO_3{\cdot}C_7H_6O_3$, obtained by double decomposition of the hydrochloride and sodium salicylate or by neutralizing the free base with the acid. *Ethyl-morphine hydrochloride* (*Dionine*); $C_{19}H_{23}NO_3{\cdot}HCl+4H_2O$. Obtained by alkylizing morphine by a number of alternative reagents. Dionine is a colourless crystalline powder of micro-needles; m.p. 123-125°C.; soluble 1 : 7·1 of water and 1 : 1·37 of EtOH. The free base liberated by alkalies melts at 93°C.; it crystallizes in glittering well formed prisms with 1 mol. H_2O; soluble 0·35 : 100 in water. Used as a substitute for morphine, which it resembles in its hypnotic action, but has not its secondary ill effects. Also given in morphino-mania. Useful as a sedative in asthma, whooping cough, and emphysema; more certain in action than codeine. Also useful in ophthalmic work. *Benzylmorphine hydrochloride* (*Peronine*), $C_{24}H_{25}NO_3HCl$. Obtained by benzylating morphine. Colourless shining needles; sparingly soluble in water. The free base forms large prisms, almost insoluble in water, readily dissolved in EtOH. Its salts with organic acids are amorphous and very soluble. Its narcotic action is greater than that of codeine, and has not the ill effects of morphine. Prescribed like codeine. *Propyl-*, *isopropyl-*, and *amyl-morphine* are less active than the other alkyl derivatives. Morphinethylene ether is almost inert. *Morphoxyl-acetic acid*, $C_{17}H_{18}NO_2OCH_2COOH$, and its salts, are fifty times less toxic than morphine, but its methyl and ethyl esters are spasmodic poisons. *Acetyl-morphine*, $C_{17}H_{17}NO{\cdot}OH{\cdot}OCOCH$, obtained by acetylizing the base, or by heating diacetyl morphine with water. It forms crystals, m.p. 187°C. The *hydrochloride* forms colourless needles, blackening at 280°C. without melting. Prescribed in phthisis, cardialgia and neuralgia. *Diacetyl morphine*, $C_{17}H_{17}NO\ (OCOCH_3)_2$, obtained by the action of

excess of acetic anhydride on morphine at 85°C. It melts at 171–172°, sparingly soluble in water. Its *hydrochloride* (*Heroine*) is a white crystalline powder, soluble 1 : 2 in water ; m.p. 230–231°C. A useful substitute for morphine, active in small doses, without influence on the blood pressure, and does not occasion constipation. Prescribed in acute and chronic bronchitis, tuberculosis, and other affections of the respiratory organs ; also as an anaesthetic and anaphrodisiac. A number of other morphine and codeine derivatives are described which have not yet received practical notice. *Apomorphine*, $C_{17}H_{17}NO_2$. Several alternative methods of preparation are given. The free base is an amorphous white mass, hygroscopic and turning green in the air. Its hydrochloride and other salts are well known emetics and expectorants. *Apocodeine hydrochloride*, $C_{18}H_{19}NO_2HCl$. Obtained by heating codeine hydrochloride with excess of strong $ZnCl_2$ solution to 170–180°C. for 15 minutes. The free base and the hydrochloride are amorphous ; the latter is readily soluble in water. Given internally and hypodermically for bronchitis. Is hypnotic and may be prescribed for a long period without affecting the kidneys. The hypodermic injection also acts as an aperient. *Morphine bromomethylate* (*Morphosan*) $C_{17}H_{19}NO_3CH_3Br$. Morphine alkaloid 100, in fine powder, is mixed with absolute alcohol 500 ; and warmed with methyl bromide 50, for 8 or 10 hours at 40–50°C. On cooling, the salt being only sparingly soluble in alcohol, crystallizes out, and is purified by recrystallization from alcohol. It may also be obtained by treating morphine, in $CHCl_3$ solution, with dimethyl-sulphate. The additive product which separates is washed with $CHCl_3$ or Et_2O, dissolved in water, and treated with saturated aqueous solution of an alkali bromide. Morphine bromomethylate separates out in fine needles. Another method is to decompose morphine chloromethylate with HBr. The crystalline mass obtained is washed with KBr solution and with cold water. Fine, colourless needles ; m.p. 265–266°C. ; soluble 1 : 20 in cold water. Salted out of aqueous solution by KBr. It has the narcotic action of morphine, but is less poisonous. *Morphine bromoethylate*, $C_{17}H_{19}NO_3 \cdot C_2H_5Br$, is obtained by similar methods, substituting ethyl bromide, etc. Colourless needles, m.p. 245. *Codeine bromomethylate* (*Eucodine*), $C_{18}H_{21}NO_3CH_3Br$, obtained by similar methods from codeine. Also by treating alcoholic solution of morphine bromomethylate with metallic Na ; then with methyl bromide. It forms when crystallized from water

compact six-sided prisms or large coffin-shaped crystals, readily soluble in cold water; m.p. 261°C. Much more soluble and less toxic than codeine. Specially useful for the cough of consumptives. *Codeine bromoethylate*, $C_2H_{26}NO_3Br+5H_2O$, is obtained in a similar manner starting with codeine and diethyl sulphate. Also by the double decomposition of codeine iodoethylate with freshly precipitated AgBr. Methods for the preparation of *codeine ethylene bromomethylate*, $C_{20}H_{26}NO_3Br+H_2O$; m.p. 267–268, *codeine ethylene bromoethylate*, $C_{21}H_{28}NO_3Br$, m.p. 225°C., are also given. *Apomorphine chloromethylate*, $C_{17}H_{17}NO_2CH_3Cl$, colourless prisms, m.p. 205-210°C. *Apomorphine bromomethylate* (*Euporphine*); colourless scales or six-sided plates, m.p. when dry 180°C. Prescribed for acute and chronic bronchitis as an expectorant. Does not act so strongly as a depressant as apomorphine, and may be administered for a longer period. Also given in croupous pneumonia. *Apomorphine methyl nitrate*, $C_{17}H_{17}NO_2CH_2NO_3$, colourless leaflets readily soluble in water. *Narcotine sulphonic acid*, $C_{22}H_{23}NO_{10}S$; *acetyl narcotine*, $C_{24}H_{25}NO_3$; *methyl narcotamide*, $C_{23}H_{28}N_2O_7$; *ethyl narcotamide*, $C_{24}H_3N_2O_7$; *methyl narcotimide*, $C_{23}H_{26}N_2O_6$; *ethyl narcotimide*, $C_{24}H_{28}N_2O_6$, are all described and processes given for their preparation. *Cotarnine*, $C_{12}H_{13}NO_3+H_2O$, is obtained together with opianic acid by oxidizing narcotine with HNO_3. It crystallizes from C_6H_6 in needles, m.p. 132–135°C., with decomposition; sparingly soluble in cold water. *Cotarnine hydrochloride* (*Stypticine*), $C_{12}H_{13}NO_3 \cdot HCl+H_2O$, forms yellow crystals soluble in water. It is a powerful haemostatic. *Cotarnine ferric chloride*, $(C_{12}H_{13}NO_3Cl)_2Fe_2Cl_6$, is obtained by evaporating absolute EtOH solutions of the components in molecular proportions. It forms fine orange yellow scales; m.p. 104°C.; readily soluble in water. *Cotarnine phthalate* (*Styptol*); cotarnine forms a neutral and an acid salt with phthalic acid; the m.p. for the former is 102–103, for the latter 115°C. Used as a haemostatic. *Narceine sodium-sodium salicylate* (*Antispasmine*), contains 1 mol. base and 3 mols. sodium salicylate. A whitish slightly hygroscopic powder, very soluble in water. Stated to be a useful hypnotic and harmless in its action. *Ethyl narceine hydrochloride* (*Narcyl*), $C_{25}H_{31}NO_8HCl$; m.p. 231°C., and of the base 175–177°C. Employed as a sedative for coughs, whooping cough; also as a hypnotic. Many other compounds and substitution products are described, which have not yet come into direct medicinal use.

Papaverine, Complete Synthesis of. A. Pictet and A. Gams. (*Comptes rend.*, 1909, **149,** 210.) The synthesis of papaverine, $C_{20}H_{21}NO_4$, identical with the natural alkaloid, has been effected by reducing homoveratrol-oxy-homoveratrylamine, $(CH_3O)_2 - CHOH - CH_2 - NH - CO - CH_2 - C_6H_3(OCH_3)_2$ by heating its solution in xylene with P_2O_5. The original paper should be consulted for the successive steps of the synthesis.

Pseudo-cinchona africana, Alkaloid of. E. Fourneau. (*Comptes rend.*, 1910, **150,** 976.) The formula, $C_{21}H_{26}N_2O_3$, for the new alkaloid (*Y.B.*, **1909,** 72), only differs from one of the formula given by Spiegel to yohimbine, $C_{21}H_{28}N_2O_4$, by a mol. H_2O. The new alkaloid also closely resembles yohimbine in properties, the greatest difference being in the respective optical rotations. In fact, Spiegel has obtained an anhydride of yohimbine which has the same centesimal composition as the *Pseudo-cinchona* base. The resemblance is continued in the behaviour of the two bases with alkalies. Yohimbine when treated with sodium ethylate, forms the acid $C_{20}H_{26}N_2O_4$, and crystallizes from MeOH anhydrous, $C_{20}H_{24}N_2O_3$. Yohimbine is considered to be the Me ester of this acid. The *Pseudo-cinchona* base behaves in a similar manner with sodium ethylate. It yields an acid which crystallizes from MeOH with the formula $C_{20}H_{24}N_2O_3$, and the original base is probably the Me ester of this. (See also *Y.B.*, **1904,** 183.)

Pyramidon: Dimethylamino-antipyrine: Errors in the Text of Official Method for the Titration of. — Duplant and Revetria (*Bull. Sci. pharm.*, 1910, **17,** 96), and H. Ribaut (*ibid.* 144.) The statement in the French Codex that dimethylamino-antipyrine solution reddens solution of helianthin is incorrect. It gives a yellow colour with that indicator when the latter is reddened by an acid. The further statement that 0·5 Gm. of compound, if pure, requires for its neutralization 21·64 c.c. of *normal* sulphuric acid, is also incorrect. This is a misprint for *decinormal.*

Quinine, Cinchonidine, Cinchonine and Quinidine Salts, Solubilities of, in Water at 25° C. G. W. Schaefer. (*Amer. J. Pharm.*, 1910, **82,** 175.) In the following list the amount of water shown is that necessary to make a solution with 1 part of the pure finely powdered salt, when kept at 25°C. for several days and frequently shaken. For the pure alkaloids saturated aqueous solutions were shaken out with suitable solvents. The

following are the solubilities found at 25°C. Quinine alkaloid, 1 : 3,000; quinine acetate, 1 : 50; quinine anisol, 1 : 2,400; quinine arsenate, 1 : 650; benzoate, 1 : 360; dihydrobromide, 1 : 5; dihydrochloride, 1 : 0·7; dihydrochloride with urea, 1 : 1; bisulphate, 1 : 85·; chlorhydrosulphate, 1 : 1·3; chromate, 1 : 3,150; citrate, 1 : 825; basic glycerophosphate, 1 : 850; hydrobromide, 1 : 43; hydrochloride, 1 : 21; hydroferrocyanide, 1 : 2,000; hydroiodide, 1 : 205; hypophosphite, 1 : 35; basic lactate, 1 : 6; nitrate, 1 : 70; oxalate, 1 : 1,400; phosphate, 1 : 800; picrate, 1 : 3,400; quinate, 3·5; salicylate, 1 : 2,100; sulphate, 1 : 700; disulphoguaiacolate, 1 : 0·5; sulphocarbolate, 1 : 250; urate, 1 : 550; phenolsulphate, 1 : 680; tartrate, 1 : 950; tannate, 1 : 2,000; valerate, 1 : 8. Cinchonidine alkaloid, 1 : 4800; cinchonidine disulphate, 1 : 1; tetrasulphate, 1 : 3; dihydrobromide, 1 : 7; hydrobromide, 1 : 60; hydrochloride, 1 : 21; dihydrochloride, 1 : 1·6; salicylate, 1 : 1,320; sulphate, 1 : 92; tannate, 1 : 1800. Cinchonine alkaloid, 1 : 8,800; bisulphate, 1 : 1·5; hydrochloride, 1 : 22; hydrobromide, 1 : 59; dihydrobromide, 1 : 1·8; salicylate, 1 : 590; sulphate, 1 : 85; tannate, 1 : 1,100; tartrate, 1 : 32. Quinidine alkaloid, 1 : 6,900; hydrobromide, 1 : 190; hydrochloride, 1 : 86; hydroiodide, 1 : 1,220; salicylate, 1 : 1,650; sulphate, 1 : 95; tannate, 1 : 2,100; tartrate, 1 : 35; bitartrate, 1 : 310.

Quinine Salts, and other Chemicals of the U.S.P. G. L. Schaefer. (*Amer. J. Pharm.*, 1910, **82**, 218.) *Quinine hydrobromide.* The statement that this salt is soluble in ether 1 : 25 is wrong. It is practically insoluble, about 1 : 700. *Quinine hydrochloride.* This is not soluble in ether 1 : 240. It is even more insoluble in that liquid than the hydrobromide, the solubility being 1 : 1,000. The commercial salt has no defined m.pt., owing to its varying degree of hydration. *Quinine salicylate.* The solubilities of this are found to be: In water at 25°C., 1 : 2,100; in water at 80°C., 1 : 280; in alcohol at 25°C., 1 : 23; in alcohol at 60°C., 1 : 5; in ether about 1 : 780; in chloroform, 1 : 10. *Codeine alkaloid.* The solubility in ether is 1 : 25, not 1 : 12·5. *Codeine phosphate.* The commercial salt contains ½ mol. H_2O. The salt with 2 mols. H_2O exists, but cannot be prepared commercially. The former variety should be made official. *Diacetyl-morphine hydrochloride.* The formula given for this in all published references, is that of the anhydrous salt. When freshly crystallized from alcohol, and dried in the

air, it contains 3 mols. H_2O. When dried at a moderate heat it becomes anhydrous, but quickly absorbs 1 mol. H_2O from the air. There is no anhydrous salt in commerce. The mono hydrated form, $C_{11}H_{17}(C_2H_3O)_2NO_3 \cdot HCl + H_2O$, should be made official. *Strychnine alkaloid.* Solubility in alcohol at 25°C. 1 : 150; in $CHCl_3$ at 25°C. 1 : 7. *Strychnine nitrate.* Solubility in water at 25°C., 1 : 55; in alcohol, 1 : 220. *Strychnine sulphate.* It does not melt, as stated, at 200°C., but at about 250°C. with decomposition. Solubility in water at 25°C., 1 : 45; at 80°C., 1 : 9; in alcohol at 25°C., 1 : 105. *Salicylic acid.* Solubility in water at 25°C., 1 : 475.

Quinine Salts, Tests for Purity of. F. Tutin. (*Pharm. J.*, 1909, **29**, 600.) The results of a long series of elaborate investigations are thus summarized by the author :—

The method for applying the ammonia test to quinine sulphate, as described by the French Pharmacopœia, is to be preferred to that given by other Pharmacopœias.

The minimum amount of 10 per cent. ammonia which will yield a clear solution at 15° with 5 c.c. of a solution of pure quinine sulphate, saturated at 15°, is 4·4 c.c. It is therefore impossible to meet the requirements of the German Pharmacopœia—namely, that not more than 4 c.c. of ammonia should be needed for this purpose. It would appear, furthermore, that the standards of the French and Dutch Pharmacopœias, especially that of the latter, are more stringent than is desirable. A minimum of 6 c.c. of ammonia, when conducting the test according to the French method, would seem a reasonable requirement.

The ammonia test, however, is not only a test for the presence in quinine sulphate of other cinchona alkaloids, inasmuch as basicity of the salt has precisely the same effect as impurity. Commercial salts of quinine, which are frequently somewhat basic, may therefore appear to be far less pure than is actually the case, unless a laborious method for correction of this factor is adopted.

Owing to the profound influence exerted by the presence of small amounts of inorganic salts on the results obtained by the ammonia test, the latter is valueless as a means of ascertaining the purity of any salt of quinine other than the normal sulphate.

Since the usefulness of the ammonia test is so limited, the test for cinchonine and cinchonidine prescribed by the present

British Pharmacopœia is much to be preferred, as it is applicable to any quinine salt. This test, however, is rendered more delicate by the use of "Æther Purificatus" instead of "Æther." The ammonia test, on the other hand, is the only means of detecting hydroquinine without having recourse to the actual isolation of this alkaloid. It yet remains to be shown, however, whether there is anything to be gained by requiring quinine sulphate to be free from the small amounts of hydroquinine sulphate with which it is liable to be associated.

Satin Wood, Alkaloid from. S. J. M. Auld. (*J. Chem. Soc.*, 1909, **95,** 886.) The wood of *Chloroxylon swietenia*, yielding the satin wood used by cabinet makers, is found to contain an alkaloid, chloroxylonine, $C_{22}H_{23}O_7N$, forming prisms m.p. 182–183°C. This base is probably the cause of the irritant action of this wood on the skin of those who handle it. The base was isolated from the alcoholic extract of the wood, by extracting with dilute HCl, liberating with AmOH, and shaking out with Et_2O. Its a_D in $CHCl_3$ solution $=+9°18'$. It crystallizes from that solvent with 1 mol. $CHCl_3$. It contains one methoxyl group, but does not form an acetyl compound. It is a weak monoacid base, forming crystalline salts, several of which are described.

Solanaceous Plants, Increase of Alkaloidal Value of, by Nitrogenous Manures. J. Chevalier. (*Comptes rend.*, 1910, **150, 344.**) The use of nitrates with farmyard manure has the effect of doubling the amount of alkaloids in the dried leaves of belladonna, hyoscyamus and stramonium. Potassic manures and phosphates have no influence on the amount of alkaloids. A plot of belladonna manured with farmyard manure and nitrates gave dried leaves yielding 0·756 per cent. of alkaloids; the percentage of the control plot grown under ordinary cultural conditions was 0·32. Similar results were obtained with hyoscyamus and stramonium.

Sparteine in Cytisus scoparius, Variation in Amount of during the Year. J. Chevalier. (*Comptes rend.*, 1910, **150,** 1068.) Determinations of the amount of sparteine made monthly during the year showed the following variations. The results are expressed in terms of sparteine sulphate, $C_{15}H_{26}N_2 1H_2SO$ $+5H_2O$ per kilo of dried plant. January, 4·02 Gm.; February, 4·15; March, 6·80; April, 3·25; May, 4·32; June, 3 27; July,

3·00; August, 2·33; September, 3·58; October, 4·07; November, 4·75; December, 4·07.

Stachydrine. R. Engeland. (*Archiv. Pharm.*, 1909, **247,** 463.) The base, stachydrine, which has been isolated from the tubers of *Stachys tubifera* and from the leaves of *Citrus vulgaris*, is closely related to betaine. The latter, however, yields trimethylamine when distilled with KOH, whereas stachydrine gives dimethylamine. It is a cyclic α-pyrrol-dicarbonic acid, and is identical with Willstaetter's *n*-methyl-hyrinic acid.

Strychnine, New Test for. P. Malaquin. (*J. Pharm. Chim.* [6], **30,** 546.) One c.c. of the solution to be tested, 1 c.c. of pure HCl, and 1 Gm. of pure Zn, are allowed to react in the cold for 2 to 4 minutes, then cooled by immersion in water. Two c.c. of pure H_2SO_4 is placed by aid of a pipette in a dry tube, and the above acid solution is cautiously floated on the surface. A pink colour zone, permanent after long boiling, indicates strychnine. Veratrine gives a red colour on contact with strong H_2SO_4, but this is discharged by boiling. Strychnine must be isolated from sugar in granules (and other admixtures) by rendering the solution alkaline, shaking out with Et_2O, and applying the above test to the alkaloidal Et_2O residue obtained by evaporation. A distinct pale pink colour is given by a dilution of 1 of strychnine in 50,000, and the colour is evident with 1 : 100,000. Other alkaloids commonly met with give no reaction.

Strychnine Salts and Compounds. G. Cohn. (*Pharm. Zentralh.*, 1910, **51,** 399.) *Strychnine arsenite.* $C_{21}H_{22}N_2O_2 \cdot As_2O_3$. A white crystalline powder, sparingly soluble in water. Prescribed for malaria, dyspepsia, tuberculosis and skin diseases. *Strychnine arsenate*, $C_{21}H_{22}N_2O_2 \cdot As_2O_5$. Given for similar affections. *Strychnine cacodylate*, $C_{21}H_{22}N_2O_2(CH_3)_2AsO_2H$. Very unstable in solution.

Theobromine, Determination of, in Theobromine Sodium Salicylate. E. Anneler. (*Pharm. Zeit.*, 1910, **55,** 282.) One Gm. of the compound dissolved in 10 c.c. of water in a separator is treated with 3 c.c. of 10 per cent. HCl solution; a few drops of phenolphthalein are added, and sufficient strong $Ba(OH)_2$ solution to give a faint red colour. The alkaline liquid is then shaken up with 20 c.c. of a 1 : 5 solution of phenol in $CHCl_3$ several times in an hour. The lower layer is then passed through

a filter moistened with $CHCl_3$ into a tared glass capsule; the aqueous portion is again shaken out three times in succession with 10 c.c. of the same solvent, and the bulked extract is evaporated. The residue is weighed as theobromine. (See also *Y.B.*, **1904**, 174.)

Theobromine Sodio salicylate, Commercial, Quality of. A. Patta. (*Arch. Farm. sper.*, 1909, 202: *Bull Sci. pharm.*, 1910, **17**, 43.) Theoretically theobromine sodio-salicylate should contain 40 per cent. of alkaloid. The preparations of many of the leading manufacturers contained practically this amount; from 39 67 to 39 85 per cent. Ten samples were met with, however, of very poor quality, yielding from 14 65 to 32 12 per cent. of theobromine. In specimens of good quality, and in four of the others, no reaction for salicylic acid could be obtained until after acidifying with acetic acid; but in six samples direct reaction was obtained for salicylic acid.

Theobromine Sodium-anisate: Anisotheobromine. G. Mossler. (*Zeitschr. d. allgem. oesterr. Apoth. Verein.*, **1910**, 149.) The compound of theobromine-sodium and sodium anisate, chemically identical with anisotheobromine, is prepared by dissolving theobromine, 45; in an aqueous solution of the calculated equivalent of NaOH; and anisic acid, 30; in sufficient Na_2CO_3 solution to neutralize it, then mixing the two liquids and evaporating to dryness. It forms a white, odourless powder, having a saline, bitter taste, soluble with difficulty in cold water or strong alcohol, more soluble in hot water or dilute alcohol, insoluble in ether and chloroform; its solutions are alkaline in reaction.

Theobromine Sodium-lactate: Theolactin. G. Mossler. (*Zeitschr. d. allgem. oesterr. Apoth. Verein.*, **1910**, 150.) The compound of theobromine sodium and sodium lactate, chemically identical with theolactin, is obtained on dissolving theobromine 18 in the equivalent quantity of NaOH, adding to a solution of sodium lactate 11·2, in water, and evaporating the mixture to dryness. It forms a white, odourless, hygroscopic powder, having a bitter taste; fairly easily soluble in cold water 1 : 16, more easily in hot, soluble with difficulty in alcohol, almost insoluble in Et_2O and $CHCl_3$; the watery solution is alkaline in reaction. The compound should be kept in a well-closed bottle, as otherwise the CO_2 of the air liberates theobromine and the solubility is consequently diminished.

ANIMAL PRODUCTS

Ambergris. (*Evans' Analyt. Notes*, **1909,** 7.) A sample of so-called ambergris contained an appreciable proportion of ozokerite. (See also *Y.B.*, **1893,** 168.)

Carmine, Ash and Moisture of. (*Southall's Report*, **1909,** 8.) Seven samples ranged in ash from 3·05 to 8·39 per cent., and in loss at 100°C. from 10·53 to 15·70 per cent.

Cantharidin, Determination of. L. S. Walbum. (*Pharm. Zentralh.*, 1909, **50,** 661.) The author compares the methods of Baudin and of Self and Greenish (*Y.B.*, **1907,** 31), and finds that the latter, although somewhat complicated and lengthy, gives distinctly higher and more accurate results than the former. Although Baudin's method is more expeditious, the amount of CS_2, 15 c.c., which he prescribes for washing the cantharidin is insufficient; at least 60 c.c. is requisite. By following this method, and adding 0·01 Gm. of cantharidin for every 15 c.c. of CS_2 used, practically the same results are obtained as with Self and Greenish's process. The author has determined the solubility of cantharidin in different solvents at the normal temperature. The figures are ;—1 : 1,482 of CS_2 ; 1 : 68,166 of petroleum ether ; 1 : 662 of toluol ; 1 : 1,149 of xylol ; 1 : 2,000 of Et_2O ; 1 : 2,288 of a mixture of petroleum ether 70 and absolute EtOH 30. Although from the insolubility of cantharidin in petroleum ether that solvent would appear to be the best for the removal of fat, this is not the case, since it fails to remove certain other substances, not cantharidin, from the $CHCl_3$ residue of the flies. The author prefers the mixture of EtOH and petroleum ether for this purpose. He washes the cantharidin in a centrifuge three times each with 15 c.c. of this mixture, and adds the correction 0·025 Gm. to the weighed result. (See also *Y.B.*, **1907,** 32.)

Cantharidin from South African Blistering Beetles. W. C. Colledge. (*Pharm. J.*, 1910 [4], **30.**) The cantharidin in six species of beetles has been determined. In each case only a few beetles were examined; consequently the results obtained cannot claim to represent the average amount of cantharidin for the species. The results obtained showed how variable is the amount of cantharidin in the beetles, and, incidentally,

indicate that South Africa may prove to be a satisfactory collecting-ground for the drug.

The cantharidin was estimated by a slightly modified form of the method of Self and Greenish (*Y.B.*, **1907**, 31).

The results obtained were :—

Mylabris oculata, Thunb.—The beetle is 30 to 35 mm. long; it is black, with two broad light yellow bands, and has two spots of the same colour on the wing-cases. The powder is brown, and possesses a characteristic odour. Yield of cantharidin, 0·615 per cent. *Mylabris holocericea*, Kley.—The beetle is about 13 mm. long; the body and wing-cases are covered with fluffy hair, giving the whole a greenish appearance. The beetle has three yellow bands and two elongated spots on the wing-cases; the edges of the wing-cases are yellow. Yield of cantharidin, 1·3 per cent. *Decatoma lunata*, Ballas.—The beetle is 20 mm. long; it has fluffy hair on the thorax and on the wing-cases. The body has three wavy yellow bands. Yield of cantharidin, 1 0 per cent. *Eletica wahlbergia*, Fabr.—The beetle is 23 mm. long, and has a very thin neck (? thorax). The body, which is covered with short hairs, is black; the wing-cases are black, with a reddish-brown edge. The back of the head is reddish-brown. Yield of cantharidin, 0 32 per cent. *Cantharis vellata*.—The body is about 20 mm. long, and, like the wing-cases, it is covered with grey-coloured hairs. Yield of cantharidin, 2 73 per cent. *Lytta coelestina*.—The body, which is bluish iridescent with greenish iridescent wing-cases, is 23 mm. long. Yield of cantharidin, 1 89 per cent. It may also be recorded that specimens of the Chinese blister fly examined by the same process showed 1 2 per cent. of cantharidin. A brown powder, in which hairs but no iridescent particles were recognized, which caused the death of a native (Kaffir) woman, was found to contain 2·18 per cent. of cantharidin. In another case a brown powder, in which yellow-banded wing-cases were recognized, was found to have 2·17 per cent. of cantharidin. This powder was found in the possession of a Kaffir witch doctor. (See also *Y.B.*, **1887**, 469.)

Caviare, Characters of. (*Med. Press*, 1910, **84**, 150.) Good caviare should not show any damaged or shrivelled grains. These should be even in size and colour. A brighter colour corresponds to recent preparation; milder salting and larger grains to better quality. Good caviare should not affect the

colour of either red or blue litmus paper when pressed on it. It should contain scarcely any free fatty acid: as little as 1 5 to 2 per cent. depreciates its value: with 3 to 4 per cent. it has gone bad. It should be absolutely free from smell. Bitter caviare should be rejected. No preservative or any other addition, except salt, should be present. For "*malossol*," or lightly salted caviare, the amount of NaCl should be 3 per cent.; for other kinds of the Russian variety 6 to 12 per cent. The amount of water should be about 47 per cent. for Russian, and 37 per cent. for "press caviare" or "*pajusnaja*."

Gelatin, Colour Reaction for. R. E. Liesegang. (*Zeits. Chem. Ind. Koll.*, 1909, **5**, 248; *Chem. Zentralbl.*, 1910, **1**, 664.) If 14 c.c. of a 40 per cent. solution of K_3PO_4 and 1 c.c. of a 1 : 10 solution of $CuCl_2$ be added to a 1 : 10 solution of gelatin, after 24 hours, both the jelly and the liquid are coloured deep violet, while the green precipitate of copper phosphate at first obtained gradually decreases.

Hyraceum. (*Pharm. Zentralh.*, 1910, **51**, 67.) This product of the Cape hyrax has a therapeutic action resembling that of castor, and is used as a substitute for that more costly drug. It forms irregular amorphous masses, plastic when kneaded in the fingers, showing fibres and hairs under the lens. The odour resembles that of resin and castor; the taste is bitter; it adheres to the tongue and is soluble in the saliva. Its reaction is faintly alkaline. When heated it gives off the odour of AmOH and of benzoin. It is almost entirely soluble in water; less so in a mixture of water and spirit; and somewhat less soluble in Et_2O and Et_2O alone. It contains: Essential oil, 0·66; resinous matter, 1·75; benzoic acid, 1·5; yellow fat, 0·25 per cent. The main constituent is the resinous substance which is insoluble in water, sparingly soluble in Et_2O; readily dissolved in a mixture of Et_2O and EtOH; this mixture dissolves half the hyraceum, and is the best menstruum for the preparation of the tincture for medicinal use. In perfumery, the slight musk odour is of but little value; hyraceum is chiefly useful as a fixative for the more volatile odours.

Klipsweet. J. Parry, also W. Froembling. (*Pharm. J.*, 1909, **29**, 632.) The origin of Klipsweet, a viscous aromatic substance found oozing from crevices of rocks, and collected by the Cape Dutch for use as a domestic remedy, has been traced

to a native bee scarcely 3 mm. in length, for which the name *Apis pygmea* has been suggested. Klipsweet and hyraceum have been attributed to various sources: microscopical examination has shown that the former is a kind of propolis used by the bees to close up holes and cover various objects: hyraceum is probably the faeces, as well as the urine, of the hyrax. The ash of Klipsweet contains a considerable amount of Mn. Chemical details and distinctive tests for these two curious domestic remedies are given.

Meat Extracts: Determination of Creatinine from and Distinction of, from Yeast Extracts. K. Micko. (*Z. Unters. Nahr. Genussm.*, 1910, **19**, 426.) Ten Gm. of the meat extract, or larger quantities in the cases of mixtures of meat and yeast extracts, are dissolved in water, basic lead acetate is added until no more precipitate forms, and the mixture is diluted with water to 1 litre. After several hours, the liquid is filtered, the filtrate is acidified with HCl, evaporated, filtered, the precipitate of $PbCl_2$ is washed with a little cold water, the filtrate and washings are concentrated, and the residual solution is mixed with several times its volume of hot EtOH. The remaining $PbCl_2$ separates out completely on cooling. The lead-free solution is now treated with an excess of HCl, evaporated to dryness, the residue dissolved in 100 c.c. of water, the solution neutralized with NaOH, and 10 c.c. of a 20 per cent. $NaHSO_3$ solution and 10 c.c. of a 13 per cent. $CuSO_4$ solution are added. The mixture is boiled, cooled, and when quite cold the precipitate is collected on a filter, and washed with cold water. The filtrate is evaporated with HCl to expel SO_2, and the Cu is removed with H_2S. The solution is next evaporated and the residue is extracted with EtOH, which is in turn evaporated and the residue again extracted with EtOH, the greater part of the alkali salts being thus eliminated. The syrupy solution of the bases thus obtained is treated with 50 c.c. of dilute H_2SO_4, an excess of 30 per cent. solution of phosphotungstic acid is added, and the mixture is allowed to stand for two days. The precipitate is then collected, washed with very dilute phosphotungstic acid solution acidified with H_2SO_4, washed back again into a vessel with hot water, and sufficient $Ba(OH)_2$ is added to render the mixture slightly alkaline. The mixture is filtered, the filtrate is neutralized with H_2SO_4, evaporated to a syrupy consistence, the residue being then dissolved in a

little dilute H_2SO_4, and again evaporated. The syrup obtained is dissolved in a small quantity of water, hot EtOH is added and the mixture is set aside for 24 hours, the clear solution being then decanted from the precipitate and evaporated. This residue is again treated with EtOH as before, and the solution is evaporated. The two EtOH residues are also dissolved in a little water and treated with EtOH. The united EtOH extracts are once more evaporated, the residue obtained is dissolved in 30 c.c. of water, the solution is boiled, rendered alkaline by the addition of $Pb(OH)_2$, and a considerable volume of hot EtOH is added. After several hours, the mixture is filtered, the filtrate is evaporated, and the Pb removed as PbS. After removing this, the solution is evaporated, and the crystalline mass obtained is treated with about 30 c.c. of 1·2 per cent. picric acid solution. Next day the creatinine picrate is collected, the filtrate evaporated under reduced pressure, and the residue again treated with the picric acid solution, this operation being repeated until no more creatinine picrate is obtained. The total creatinine picrate is heated with dilute HCl, and the picric acid liberated is extracted by means of toluene. The acid solution containing the creatinine hydrochloride is concentrated, treated with animal charcoal and evaporated until crystallization commences. After cooling, the mass of crystals is treated with a mixture of 1 part of acetone with 2 parts of absolute alcohol, and the crystals are collected on a filter. The filtrate is evaporated, the residue is treated as before with acetone and alcohol, and the small quantity of creatinine hydrochloride thus obtained is added to the main bulk. The yield of creatinine hydrochloride obtained in the case of meat extract is about 0·45 Gm. Yeast extracts do not yield any creatinine hydrochloride.

Milk, Asses', Test to detect Admixture of Cows' Milk with. L. Grimbert. (*J. Pharm. Chim.*, 1909, **30**, 298.) At many health resorts asses' milk is taken by invalids as being more easily digested, and more nourishing, than that of cows. Since its price is relatively much higher than that of cows' milk, the danger of fraudulent admixture or substitution is present. Since asses' milk, like human milk, does not contain any anaeroxydase, such admixture is readily detected as follows: Ten c.c. of the milk is treated with 5 c.c. of a 1 : 100 solution of crystalline guaiacol; then, without mixing, with 10 drops of

H_2O_2 solution. With cows' milk an immediate bright red colour appears at the zone of contact: pure asses' milk gives no reaction. A mixture of the two more or less rapidly shows a red to pink reaction, according to the amount of cows' milk present. As little as 5 per cent. is easily detected. Cows' milk which has been boiled gives no reaction, since its anaeroxydase has been destroyed.

Milk, Calcium Carbonophosphate in, precipitated by Pasteurization. A. Barillé. (*J. Pharm. Chim.*, 1909, **30**, 444.) The lime in milk occurs naturally in the form of carbonophosphate: a compound easily assimilated, yet readily broken up into crystalline Ca_2HPO_4 and $CaCO_3$. This decomposition occurs when milk is pasteurized, and therefore materially diminishes its value from a dietetic standpoint, especially for infants. Such milk may be efficiently sterilized by exposure to ultra-violet rays, which does not affect the natural lime salts.

Milk from Tuberculous Cows, Abnormal Characters of. A. Monvoisin. (*Comptes rend.*, 1909, **149**, 644, 695.) The milk of cows attacked by mammary tuberculosis presents many abnormal characters, one of the most marked and easily observed being the low amount of free acid. In general characters, this morbid milk approaches very closely to those of blood serum. The following figures indicate the difference between the fresh milk from healthy cows and those with mammary tuberculosis.

	Fresh Normal Milk.	Tuberculous Milk
Acidity in terms of lactic acid	1·54 per 1,000	0·12 to 0·23 per 1,000
Albuminoids	38·5 „ „	72·4 „ „
Total N	5·87 „ „	8·24 to 10·8 „ „
Fat	46·5 „ „	0·7 „ „
Lactose	43·5 „ „	0 to 0·2 „ „
Ash	7·3 „ „	9·6 „ „
Cl in NaCl	1·4 „ „	5·1 „ „

When mammitis is caused by infection with organisms other than the tubercle bacillus, the acidity of the milk is not diminished. The determination of a low acidity of freshly drawn milk is sufficient evidence of tuberculous infection, even if the specific bacillus has not been found. All milk which shows a total

acidity, when freshly drawn, below the normal, should be at once rejected for use for infants.

Silajit, an Ancient Eastern Medicine. D. Hooper. (*Pharm. J.*, 1910, **30,** 24.) The connexion between this substance and klipsweet is remarkable, since the meaning of the two words is the same. In general properties silajit appears to closely resemble the South African klipsweet. There are at least two varieties of substances under this name which have been mentioned in Indian works or met with in the bazaars. White silajit is of a mineral nature, and is more or less pure aluminium sulphate, and has no connexion with the animal product. The second variety of this substance, called black silajit, is quite a different article. As sold in the bazaars of Calcutta it is in the form of dark brown or black cakes, tough and pasty in consistence, and has an odour of rancidity which has been stated in Sanskrit works to resemble cow's urine. The usual odour is that of leather. Its taste is bitter, saline, pungent, and astringent. It is hygroscopic when exposed to a damp atmosphere, and becomes unctuous and sticky. In a dry state it is quite hard, and breaks with a shining black fracture, and in course of time some samples assume a brownish crystalline efflorescence. It is soluble for the most part in distilled water, yielding a dark, reddish-brown extract with an alkaline reaction. Ether and alcohol have very little solvent action upon it. In a few cases ether extracted a small amount of fat having the peculiar odour of the drug. The organic matter is of the nature of an organic acid, and not related to bitumen. The insoluble matter, in most instances, consists of vegetable débris and sand. About a dozen samples have been examined in the Indian Museum, and the ash was found to vary from 30 to 60 per cent., consisting mainly of carbonated alkalies. Small quantities of alumina, iron, and manganese were also present, but there was no uniformity in the composition. The presence of over 5 per cent. of phosphoric acid, combined with much nitrogen and a strong odour, indicated in some samples an animal source. With the native doctors the mineral constituents are regarded as impurities, and the active principle is said to reside in a cream-like body, which rises to the surface of the liquid when solid silajit is dissolved in hot water.

Cream-coloured Samples.—A third kind of silajit has been received from Jeypur and Baluchistan. The samples were

cream-coloured crystalline compounds, with a strong nauseous odour. They were evidently of animal origin, and evolved gaseous ammonia when mixed with slaked lime. They yielded 54 and 64 per cent. of pure urea when determined from the amount of nitrogen given off by means of sodium hypobromate. They were, therefore, crude urea, or inspissated urine. It is stated by some authorities to be the urine of the wild hill goat, when the animal is rutting, which is discharged on the stones and evaporated by the sun's heat. It is found in small quantities. Some have said it is the urine of the wild ass, found as above. In a Persian work on materia medica, it is said that silajit is generally found among the haunts of monkeys, and that the drug is the alvine discharge of a certain species with a black face and long tail. Such are the varieties of silajit met with in India, and which form a favourite medicine with Hindu physicians; the author of *Charaka* says that there is no curable disease which will not yield to silajatu in judicious combination with other drugs. From Baluchistan samples of silajit have been received under the names of *khatmolt* (rock smoke), *mashana churro* (hill juice), *maulai* and *mumiai*, found in inaccessible places in the Jalai and Pab Hills. It is thus evident that a substance similar to silajit is related to the famous Persian drug called *mumiai*, or *arkuljibbal* (meaning "essence of stone"). The Mummy Mountain in Persia, whence this secretion was obtained, was supposed to be the burial-place of the nobility, and the Persians say that the prophet Daniel taught them the preparation and use of *mumiai*. Here there is a connexion between the Persian drug and the medicinal use of mummies in ancient Egypt, and in Europe during the middle ages. It would form the subject of a fascinating ethnological study to trace back to primitive times the use of silajit of North India and klipsweet of South Africa.

Yolk of Egg, Dried, Spurious. Bordas and Touplain. (*Répert. Pharm.*, 1910, **22**, 115; *Annales des falsificat.*) Two samples of reputed granulated yolk of egg were found to be merely casein, coloured with coal tar yellows. Mere heating is sufficient to distinguish genuine egg yolk; it gives off a characteristic odour, quite distinct from that of casein. Pure dried egg yolk contains over 50 per cent. of fat, soluble in ether; and 14 per cent. of extractive, soluble in alcohol 95 per cent.

The spurious samples gave relatively small quantities of soluble matter to both these solvents.

CLINICAL TESTS

Gastric Secretion, Determination of Trypsin and Pepsin in, by Means of Casein. Hammarsten. (*Merck's Report,* 1909, **22,** 169.) Pure casein is dissolved in a 0·1 per cent. solution of NaOH in the proportion of 1 : 1,000. A series of test tubes is filled each with 10 c.c. of this solution. The tubes are warmed to 40°C. and measured increasing quantities of the liquid to be tested are added to the series. After 15 minutes, acetic acid 1 per cent. in excess is added to each tube. The tube in which turbidity is first evident shows when trypsic digestion is first incomplete. This gives the amount of the liquid under examination required to digest 0·01 Gm. of casein. Peptic activity is determined in a similar manner, in an acid medium. The casein, 1 Gm., is dissolved in 16 c.c. of HCl, sp. gr. 1·129, and diluted to 1,000 c.c. with water. Ten c.c. of this is introduced in each of a series of tubes, and the test is conducted as above, strong solution of sodium acetate being used instead of acetic acid, as the precipitant.

Reagents, Official, for Clinical Tests. (*Apoth. Zeit.,* 1910, **25,** 789.) It is proposed that the following clinical reagents shall be officially included in the next edition of the Ph.G.

URINE REAGENTS

For the Detection of Albumin.—Acetic acid, at least 98 per cent. The same, dilute, 30 per cent. K_4FeCy_6 solution 5 per cent. *Esbach's solution :* Picric acid 1, citric acid 2, dissolved in water 97. Sulphosalicylic acid solution 1 : 5.

For the Detection of Sugar.—NaOH solution about 15 per cent. $CuSO_4$ solution 1 : 10. *Nylander's solution :* $NaKC_4H_4O_6$, 4 ; NaOH, 10 ; dissolved in water 90 ; basic bismuth nitrate is then added and dissolved with agitation. *Fehling's solution :* (*a*) $CuSO_4+5H_2O$, 3·5 Gm., is dissolved in water to make 50 c.c. (*b*) $NaKC_4H_4O_6+4H_2O$, 17·5 Gm. ; NaOH, 5 Gm., are dissolved in sufficient water to make another 50 c.c. The two solutions are to be kept separate and mixed immediately before use, in equal volumes. Phenylhydrazine hydrochloride. Sodium acetate.

For the Detection of Pentoses.—Orcinol. *Bial's solution ;*

Orcinol, 1 Gm., is dissolved in HCl, 30 per cent. (sp. gr. 1·149), 500 c.c., and the solution treated with 25 drops of Fe_2Cl_6 solution. Phloroglucinol.

For the Detection of Acetone.—Sodium nitroprusside. *Iodine-Potassium Iodide Solution:* Iodine 4, KI 6, are dissolved in water 90. Tincture of iodine approximately 1 : 10.

For the Detection of Aceto-acetic Acid.—Fe_2Cl_6 solution 1 : 10.

For the Detection of Urobilin.—Amyl alcohol $ZnCl_2$ solution, 1 : 10. Alcoholic zinc acetate solution 1 : 10.

For the Detection of Urobilinogen.—Ehrlich's reagent: Dimethylparaminobenzaldehyde 2, is dissolved in 98 of a mixture of HCl 4, and water 1.

For the Detection of Bile Pigments.—HNO_3 containing HNO_2. $CaCl_2$ solution 1 : 10. Alcoholic iodine solution 1 : 100.

For the Detection of Indican.—Chlorinated lime, saturated solution: to be diluted with an equal volume of water.

Obermayer's solution: A solution of Fe_2Cl_6, 1, in fuming HCl, 250. Lead acetate solution, 1 : 4. $CHCl_3$.

For the Diazo-reaction.—(*a*) $NaNO_2$ solution 1 : 200. (*b*) Sulphanilic acid, 5 Gm. is dissolved in HCl 50 c.c. and diluted with water to 1,000 c.c. The solutions are to be kept separate. Before use 1 c.c. of (*a*) is mixed with 50 c.c. of (*b*).

For the Detection of Iodine.—$NaNO_2$ solution 1 : 100. Dilute H_2SO_4 about 16 : 100. $CHCl_3$.

For the Detection of Salicylic Acid.—Fe_2Cl_6 solution containing about 1 : 10 of Fe.

For the Detection of Blood.—Resin of guaiacum solution in absolute alcohol 1 : 4. Ozonized turpentine oil. To be kept separate.

Reagents for Testing Gastric Contents

Congo red paper: Filter-paper moistened with 1 : 1,000 solution of congo red and dried. *Gunzburg's solution:* Phloroglucinol 2, vanillin 1, dissolved in absolute EtOH 30. Dimethylaminoazobenzol. N/10 HCl solution. N/10 KOH solution. Phenolphthalein indicator, 1 : 100 in dilute alcohol. Resolic acid 1, in alcohol 68 per cent. 100.

For the Examination of Blood

Hayem's blood count solution: Na_2SO_4, $10H_2O$, 5; NaCl, 1; $HgCl_2$, 0·5; dissolved in water, 200. *Acetic acid solution for leucocyte counting:* 0·33 : 100 solution of acetic acid.

Jenner's eosine-methyl-blue solution for staining blood cells.—One hundred and twenty-five c.c. of a 0·5 : 100 solution of eosine in methyl alcohol, and 100 c.c. of a 0·5 : 100 solution of methylene blue in the same solvent are mixed.

FOR THE DETECTION OF BACTERIA AND PROTOZOA

Loeffler's methylene blue solution : Methylene blue 0·5 is dissolved in alcohol 68 per cent. 30, and mixed with 100 of about 1 : 1,000 solution of KOH. *Borax methylene blue reagent:* Methylene blue 1, is dissolved in boiling 5 per cent. solution of borax. *Dilute carbol-fuchsine solution:* Strong carbol fuchsine solution 1 : water 4. *Strong carbol-fuchsine solution for tubercule bacilli :* Fuchsine 1, alcohol 68 per cent. 10, dissolve and add phenol solution 5 per cent. 90. *Decolourizing reagent:* Nitric acid 20 per cent., alcohol about 60 per cent. *Counterstain :* Loeffler's methylene blue stain.

GRAM'S STAINS

Aniline-gentian violet solution : Aniline, 5 c.c., is shaken for several minutes with water 100 c.c. The turbid solution is filtered through a moist filter. The filtrate is mixed with 7 c.c. of saturated alcoholic solution of gentian violet, and 10 c.c. of absolute alcohol. *Carbol-gentian violet reagent:* Saturated alcoholic solution of gentian violet, 1 ; 5 per cent. solution of phenol, 9. Mix. Dilute Lugol's solution. Iodine, 1 ; KI, 2 ; water, 300. Dissolve. *Counterstain :* Dilute carbol-fuchsine solution.

Spermatozoa, Detection of, on Textile Material. B. Bacchi. (*Deutsch. Med. Woch.*, 1909, 1105. *Pharm. Zentralh.*, 1910, **51,** 52.) (1) A few fibres from the spot are immersed for 15 to 30 seconds in saturated aqueous solution of acid fuchsine. They are then decolourized in HCl alcohol (alcohol 70 per cent., 100 c.c. ; HCl, 1 c.c.) for 10 to 30 seconds or until only a light pink shade remains. The preparation is then transferred to absolute EtOH and immersed for 15 to 20 seconds. The fibres are then teazed out on a slide in a drop of xylol. After removing excess of fluid with absorbent paper, the preparation is mounted in balsam.

(2) The suspected fibres are macerated in saturated aqueous solution of methylene blue for 10 to 20 seconds ; then decolourized in the above HCl alcohol until they show only a light bluish green tint. They are then treated as above.

(3) The fibres are stained with acid fuchsine and decolourized as in (1). Then washed in EtOH, 70 per cent. Again stained with methylene blue as in (2). Finally teazed out and mounted in xylol. (See also *Y.B.*, **1907**, 147, 149.)

Spirochaeta pallida, Rapid Method for Staining. J. D. Weiss. (*Pharm. Zeit.*, 1909, **54**, 799.) Manaham's stain is recommended for the purpose. Five Gm. of dried methylene blue-eosine precipitate is suspended in 100 c.c. of MeOH ; when a saturated solution has been obtained, the liquid is filtered. To 30 c.c. of the filtrate 10 c.c. of pure MeOH is added. This stain is added drop by drop to the preparation, so as to immerse it entirely ; after one minute, water is added drop by drop (about four drops will be sufficient) so as to obtain a pellicle with a metallic aspect. The stain is allowed to act for 5 minutes ; excess of colour is then removed with water. After drying off over the flame, the stained material is mounted in balsam. Blood corpuscles are coloured red, and *Spirochaetae* reddish purple.

Transudates and Exsudates, Rivalta's Reaction to distinguish between. Barbier de la Serre. (*L'Union Pharm.*, 1910, **51**, 3.) Exsudates, the serum formed by inflamed tissues, give a very marked reaction when tested as follows: One drop of acetic acid 1 : 2 is added to 50 c.c. of distilled water, in a tall glass vessel. One drop of the liquid to be tested is then allowed to fall in it. As this descends, it will form opalescent striae or rings, like the smoke from a cigar, if the secretion be of inflammatory origin. If, on the other hand, it is a transudate, the product of non-inflammatory processes, there will be no reaction. The method should prove useful as an aid to clinical diagnosis.

Tubercle Bacilli, Detection of, with Antiformin. A. Stephan. (*Apoth. Zeit.*, 1910, **25**, 250.) Antiformin, a German proprietary solvent of organic matter, is a mixture of KOH and NaClO in solution. It dissolves up mucus, expectorations and other excreta and tissues, and has been found useful in the isolation of tubercle bacilli. The sputum is treated in a wide flask with 5 times the volume of 20 per cent. antiformin solution until the mixture is uniform, which will occur in from 30 minutes to 2 hours. From 10 to 20 c.c. of the solution is then transferred to a narrow stoppered tube, a similar volume of water is added, then 1 or 2 c.c. of petroleum ether. On agitation, an emulsion is formed, which separates on warming to

60°C. The bacilli will be found collected on the zone of separation of the two liquids, whence they may be transferred by means of Pt loops to cover glasses and stained by the usual methods. (See also *Y.B.*, **1904**, 351; **1909**, 174.)

Tubercle Bacilli, Separation of, by the Ellermann Erlanden Method. H. Koegel. (*Apoth. Zeit.*, 1909, **24**, 923.) From 10 to 15 c.c. of sputum is treated with half its volume of 0·6 : 100 Na_2CO_3 solution, well shaken up, and kept at 37°C. for 24 hours in a closed cylinder. The greater part of the liquid is then decanted, and centrifugated. The deposit thus obtained is mixed with four volumes of 0·25 : 100 NaCl solution; after well mixing this is heated to boiling. The cold liquid is again centrifugated and the deposit examined. It is claimed that from 15 to 30 times more tubercle bacilli will be found in the microfield by this process than by any other method; it has given positive results in doubtful cases where other processes have failed.

Urine Analysis, Extemporaneous Preparation of Hypobromite Solution for Urea Determinations. A. Job and Clarens. (*J. Pharm. Chim.*, 1909, **30**, 100.) By adding 1 Gm. of KBr to 30 c.c. of solution of chlorinated potash, an active hypobromite solution may be prepared extemporaneously. The mixture should be made five minutes previous to making the urea determination.

Urine, Approximate Quantitative Determination of Albumin in, with Phosphotungstic Acid Reagent. J. Tsuchiya. (*Merck's Report*, 1909, **22**, 112.) Crystalline phosphotungstic acid, 1 5 Gm., is dissolved in alcohol 96 per cent. 100 Gm., and HCl 5 Gm. This reagent is used instead of Esbach's picric acid solution. It has the advantage of giving a more definite precipitate with small quantities of albumin, and of not forming a crystalline deposit. The urine should be diluted, if necessary, to a sp. gr. of 1 006 to 1 008 before testing. The ordinary Esbach tube may be used, but the author has devised a special improved form.

Urine, Detection of Acetone in. R. Fritsch. (*Z. anal. Chem.*, 1910, **49**, 94.) The urine is warmed with an equal volume of strong HCl containing a few drops of a 5 per cent. solution of rhamnose; in the presence of acetone a fine magenta colour is obtained, which is very permanent. This reaction is very

sensitive and will detect a dilution of acetone 1 : 10,000. (See also *Y.B.*, **1904,** 177; **1906,** 78; **1907,** 165; **1908,** 204.)

Urine, Detection of Adrenine in. H. Schur. (*Pharm. Zentralh.*, 1910, **51,** 422.) A few drops of iodine tincture are added to the urine, and the mixture is shaken out with Et_2O. The presence of adrenine is shown by the appearance of a yellow colour in the Et_2O on separation.

Urine, Detection of Blood in. — Albarran and — Heitz Boyer. (*Pharm. Zentralh.*, 1910, **51,** 569.) A reagent is prepared by dissolving phenolphthalein 2, caustic potash 20, in boiling water 100; zinc dust 20, is then added. As soon as the red colour is discharged, the hot liquid is quickly filtered. Two c.c. of the urine is mixed with 1 c.c. of this reagent, shaken and treated with 3 or 4 drops of H_2O_2 solution (12 volumes). In the presence of blood, a red colour is apparent in a few seconds to two or three minutes, according to the amount. This test will detect blood in a dilution of 1 : 100,000. (See also *Y.B.*, **1907,** 26; **1908,** 202.)

Urine, Detection of Glucose in, New Reagent for. H. Bottu. (*Bull Sci. pharm.*, 1909, **16,** 399.) The reagent is made thus: 3·50 Gm. of orthonitro-phenyl-propiolic acid in powder is introduced into a litre flask, then 50 c.c. of a freshly prepared 10 per cent. aqueous solution of NaOH is added; after mixing, the solution is made up to one litre with cold distilled water. Of this liquid, 8 c.c. is placed in a test-tube, about 1 c.c. of the urine added, and mixed, and the upper layer of the liquid is heated in a moderate flame; when the top of the liquid boils, the tube is withdrawn from the source of heat, and then 1 c.c. more of urine is added, drop by drop, the heating not being renewed. If the urine contains glucose, an indigo blue colour results, commencing at the top. The reaction occurs distinctly in urine containing not more than 1 Gm. of glucose per litre. If reduction occur before the second addition of urine, it may be concluded that the glucose content exceeds 10 Gm. per litre. The reaction is both delicate and distinctive even with urine containing much creatinin, xantho-uric compounds, and ammonia salts. (See also *Y.B.*, **1904,** 178; **1907,** 169, 171, 172, 173; **1909,** 92.)

Urine, Detection of Quinine in. M. Nishi. (*J. Pharm. Chim.*, **1909, 30,** 112.) Quinine in solution in Et_2O may be

precipitated by means of a solution of citric acid in the same solvent. Acid quinine citrate is formed, which is insoluble in Et_2O. By this method 34·45 per cent. of the amount of the base administered was found in the urine of a patient 72 hours after taking 8 grains of quinine.

Urine, Detection of Sugar in, by Means of Phenylhydrazine. — Deval. (*Répert. Pharm.*, 1910, **22,** 13.) Fifty c.c. of the urine is treated with neutral or basic lead acetate solution, or with Patein's Hg_2NO_3 reagent, and filtered. To the filtrate, phenylhydrazine solution, 2 c.c.; glacial $HC_2H_3O_2$, 2 c.c.; and $NaC_2H_3O_2$ 1 : 4, 2 c.c., are added. The mixture is then heated for 1 hour on the boiling water-bath. If more than 0·65 Gm. of sugar per litre be present, a precipitate will form in the hot liquid. If less than this quantity, no precipitate will appear until the solution cools. It is collected and washed, first with cold distilled water, then with MeOH. The product will be a yellow crystalline powder, showing small aggregated needles under the microscope. The glucosazone is insoluble in water, MeOH, C_6H_6, Et_2O, and in acetone and water in equal volumes; sparingly soluble in absolute EtOH; more soluble in EtOH 60 per cent. When purified by recrystallization from dilute alcohol, it melts at 230°C. on the Maquenne block.

Urine, Fermentation Test for Sugar in. E. W. Pollard. (*Pharm. J.*, 1910, **30,** 726.) The fermentation test with pure washed yeast is stated to compare favourably with the usual volumetric methods for the determination of sugar in urine. Brewers' yeast of the very best quality is first diluted with water and allowed to stand a day or so to allow any fermentable matter in it to be decomposed. It is then thoroughly washed, either by repeated decantation or, preferably, on the filter-pump, air being drawn through to dry it as much as possible. A trace of this yeast when added to urine will not appreciably alter the sp. gr. About 0·1 Gm. of this washed yeast is mixed with 100 c.c. of the urine to be tested, and the gravity taken at 60° F. This is placed in a somewhat squat 6-oz. bottle, capped with a leech bite teat, this acting as a valve and keeping an atmosphere of carbon dioxide. The bottle is kept in quite a warm place (70°–90°) for at least two days, until fermentation is complete. If the temperature falls in the night fermentation may be suspended, so that complete clarification must take place at about 80° F. The liquid is then boiled down to about

half, made up to 100 c.c. with water, and the sp. gr. taken at 60° F. The resultant loss of degrees will, when divided by 3·7, indicate the percentage of sugar originally present. The results obtained are as concordant as is practically possible. For sugar solutions of less than 1 per cent. determination with Fehling's solution is preferable; but with stronger solutions, whereas the error with "Fehling" increases, the accuracy of the fermentation process appears to increase. Experiments on the value of gasometric determinations of the volume of CO_2 evolved are being conducted.

Urine, Permanence of Acidity of, in Tuberculosis. — Malmejac. (*Schweiz. Woch. Chem. Pharm.*, **47**, 696.) It is stated that the urine of tuberculous patients retains its acidity for a much longer period than that of non-tuberculous individuals. Normal aseptic urine does not remain acid for longer than 3 to 10 days when kept in contact with air; but that from cases of phthisis will remain acid from 12 days to 3 months. The mean period of this retention of acid is 17 days. To determine the acidity 10 c.c. of the urine, diluted with 50 c.c. of water, is titrated with decinormal alkali, using phenolphthalein indicator, and expressing the results in terms of sulphuric acid in 1 litre. In tuberculosis, the total acidity increases with the development of the disease. Thus, in the first stage, the mean amount of acid, as sulphuric acid, is 0 6756 Gm. per litre; in the second stage, 0 9910; and in the third stage, 2·2870. The determination of the acidity of the urine with the observation of the period of persistence of the acid reaction is claimed to be a useful diagnostic test, earlier in the course of the disease than any other. The urine of patients affected with pulmonary diseases, other than tuberculosis, does not show this persistent acidity.

Urine, Sensitive Test for Albumin in. T. Morikaw. (*Pharm. Zeit.*, 1909, **54**, 612.) Five c.c. of urine, previously diluted with 10 or 15 c.c. of water, is carefully floated on 3 c.c. of KI solution and 2 drops of acetic acid, 36 per cent., in a test-tube. In presence of albumin, a white ring is formed at the zone of contact; immediately if as much as 0 01 or 0 02 per cent. is present, and in two minutes with as little as 0·005 per cent. (See also *Y.B.*, **1904,** 176; **1905,** 15; **1907,** 165; **1909,** 202.)

Urine, Sensitive Reaction for Albumin in. Y. Oguro.

(*Apoth. Zeit.*, 1910, **25,** 31.) Five or six c.c. of urine acidified with dilute acetic acid is shaken up with 1 c.c. of tincture of iodine. The dirty brown flocculent mixture is then treated with saturated sodium bisulphite solution until the brown colour is discharged. If no albumin be present, the liquid will be clear: in its presence a more or less marked turbidity or precipitate will be formed; in the case of traces this appears in a few minutes. It is stated that a dilution of 1 : 120,000 may be thus detected. The iodine tincture may be first decolourized with the bisulphite, filtered and the filtrate added to the urine.

Urine, Sensitive Tests for Bile in. A. Torday and A. Klicr. (*Pharm. Zeit.*, 1909, **54,** 702.) A number of aniline colours give distinctive reactions with urine containing bile, more sensitive than many of the tests generally employed. Methylene blue, azure blue, Giemsa's solution, methylene green, thionine, and toluidine green, all give a green colour reaction. Dahlia green and pyronine give a yellow tint. Cresyl violet, methyl violet, methyl blue, and gentian violet give a red colour. The best results are obtained by adding 1 c.c. of a 1 : 100 solution of these colours to 15 c.c. of the urine.

Urine, Typhoid, Colour Reaction for. Volvoski. (*L'Union pharm.*, 1910, **50,** 350.) Five c.c. of the urine, which should not be fresh but at least 12 hours old, is mixed with 5 c.c. of strong HCl, sp. gr. 1·190, then treated with 1 c.c. of $CHCl_3$ and again gently mixed. In the case of typhoid the $CHCl_3$ will show a bluish colour. It is preferable that the urine should represent the total excretion of 24 hours. (See also *Y.B.*, **1906,** 81.)

COLOURING MATTERS

Bixin, Constitution of. J. F. B. Van Hasselt. (*Chem. Zentr.*, 1909, **2,** 624.) Bixin, the red dyestuff of annatto (*Bixa orellana*) has the composition $C_{29}H_{34}O_5$; it contains one hydroxyl and one methoxyl group; m.p. 189°C., and when heated in a current of hydrogen at 200°C. evolves one molecular proportion of *m*-xylene, leaving a colourless residue. By the action of dilute KOH on bixin, there are formed first, potassium bixinate, $C_{28}H_{30}O_3(OK)(OCH_3)$, and then dipotassium norbixinate, $C_{28}H_{30}O_3(OK)_2$. The latter when treated with dilute acids

yields norbixin, $C_{28}H_{30}O_3(OH)_2$, a bright red, crystalline substance, which decomposes at 240°C., and can be converted into bixin by partial methylation. The author is unable to confirm Zwick's statement (*Arch. Pharm.*, **238**, 58) that on heating with steam, bixin yields palmitic acid.

Carthamin. T. Komaetaka and A. G. Perkin. (*Proc. Chem. Soc.*, 190, **25**, 223.) The red colouring matter of safflower, *Carthamus tinctoria*, forms red iridescent, very hygroscopic needles, decomposing about 228–230 after being dried at 110°C. Its formula is probably $C_{10}H_{14}O_7$. The authors agree with results previously recorded by Radcliffe, but consider that his carthamin was not pure, regarding it as a salt, as the colouring matter is very difficult to purify from Ca Mg and K salts. The best solvent for it is pyridine and water.

Colours allowed to be used in France in Food Products. F. Muttelet. (*Ann. des Falsific.*, 1909, **2**, 26, 243.) By a decree issued by the French Minister of the Interior and dated August 4, 1908, certain dye-stuffs may be employed for colouring articles of food and beverages. These are :—Eosine (tetrabromofluoresceine) ; erythrosine (methyl and ethyl derivatives of eosine) ; Bengal-phloxine rose (iodine and bromine derivatives of chlorinated fluoresceine) ; Bordeaux ponceau reds (prepared by the action of sulphonic derivatives of naphthol on diazoxylenes) ; acid yellow, golden yellow (sulphonic derivatives of naphthol) ; acid magenta (free from arsenic and prepared by Coupier's process) ; Lyons blue, light blue, Coupier blue (derivatives of triphenylrosaniline or of diphenylamine) ; malachite green (tetramethyldiaminotriphenylcarbinol hydrochloride) ; greens made of mixtures of the above-mentioned blues and yellows ; Paris violet (penta- and hexa-methylpara rosaniline hydrochlorides) ; and methylaniline violet. The author considers that other dyestuffs might be admitted as coming under the above nomenclature, and suggests that the list might be enlarged so as to also include :—Rhodamine B (diethylmetaminophenolphthalein) ; Bordeaux S (naphthionic-azo-β-naphtholdisulphonic acid R) ; new coccine (naphthionic-azo-β-naphtholdisulphonic acid G) ; solid red E (naphthionic-azo-β-naphtholmonosulphonic acid S) ; Bordeaux G (aminoazotoluenesulpho-azo-β-naphtholmonosulphonic acid S) ; Ponceau 2R (metaxylidine-azo-β-naphtholdisulphonic acid R) ; xylidine scarlet (xylidine-azo-β-naphtholmonosulphonic acid S) ; acid magenta (magenta-trisulphonic acid) ; magenta

(rosaniline and para-rosaniline hydrochlorides); orange I (sulphanilic-azo-α-naphthol); naphthol yellow S (dinitro-α-naphtholsulphonic acid); chrysoine (sulphanilic-azo-resorcinol); auramine O (di-iminotetramethyldiaminodiphenylmethane hydrochloride); acid green (diethyldibenzyldiaminotriphenylcarbinol-trisulphonic acid); patent blue (meta-hydroxytetra-ethyl-diaminotriphenylcarbinoldisulphonic acid); and Coupier's blacks (sulphonated indulins and nigrosines). The use of Martius' yellow (dinitro-α-naphthol) and a malachite green (tetramethyl-diaminotriphenylcarbinol picrate) is not to be permitted.

Colours, Artificial, Detection of, in Galenical Preparations and Vegetable Juices. — Paul. (*J. Pharm. Chim.*, 1910, **1**, 289.) Natural colours are bleached by H_2O_2 much more rapidly than solutions of artificial dyes. If from 3 to 10 c.c. of a fruit juice (cherry, raspberry, quince, gooseberry, mulberry), be mixed with 20 c.c. of H_2O_2 and the tube left open, decolorization will take place within 48 hours at the ordinary temperature. In the case of buckthorn 1 c.c. of the juice treated in the same way gives a greenish colouration owing to the presence of chlorophyll; but if, after about 25 minutes, the mixture of juice and hydrogen peroxide is shaken with 2 to 3 c.c. of petroleum spirit, a colourless liquid is finally obtained. Red wine (3 c.c.) is also decolourized within 48 hours. On the other hand, the same fruit juices and wine artificially coloured by means of one of the following dyes: orcein, Bismarck brown, rosaniline hydrochloride, Bordeaux red, magenta, will retain its colour for eight days after the treatment. Liquids coloured with picric acid, methyl green, and $CuSO_4$ also remain unaffected by H_2O_2. The colourations due to the two latter substances may be distinguished from that of chlorophyll by the fact that they do not disappear on shaking with petroleum ether.

Gossypium herbaceum Flowers, Colouring Matter of. A. G. Perkin. (*J. Chem. Soc.*, 1909, **95**, 2181.) The alcoholic extract of Egyptian cotton flowers deposits, on evaporation, an orange brown glucosidal precipitate, soluble in water. The aqueous solution gives a red precipitate with lead acetate, which when decomposed by H_2S affords a mixture of two glucosides. From this a new glucoside, *quercimeritrin*, was isolated by fractional crystallization from methyl alcohol and water, and finally from pyridine and water. It forms yellow tablets, $C_{21}H_{20}O_{12}$, with 3 mols. H_2O from pyridine solution; m.p.

247–249°C., very soluble in boiling water, insoluble in cold; the alkaline solution is deep yellow. It gives an olive green colour-reaction with Fe_2Cl_6, and is hydrolized with some difficulty; it then affords quercetin and dextrose. The acetyl derivative, $C_{21}H_{12}O_{12}(C_2H_3O)_8$, melts at 214°–216°C. Quercimeritrin dyes mordanted wool almost the same shade as quercetin. From the mother liquor of quercimetrin a small amount of another glucoside *gossypitrin*, $C_{21}H_{20}O_{13}$, was obtained in orange yellow needles, m.p. 200–202°C. When hydrolized with dilute H_2SO_4 this yields *gossypetin*. From the aqueous solution of the potassium salts of quercimeritrin, precipitated by neutral lead acetate and filtered, basic lead acetate gives a further red precipitate from the filtrate, which, when decomposed with H_2S, yields isoquereitrin, $C_{21}H_{20}O_{12}$, crystallizing in yellow needles from pyridine and water; m.p. 217–219°C.; insoluble in cold water, very soluble on heating. It yields the same hydrolysis products as quercimeritrin, but is much more easily hydrolized.

Hibiscus sabdariffa and Thespasia lampas, Colouring Matters of the Flowers of. A. G. Perkin. (*Proc. Chem. Soc.*, 1909, **25**, 248.) The flowers of *Hibiscus sabdariffa* yielded 0 36 per cent. of a mixture of three colouring matters, one of which was gossypetin, $C_{15}H_{10}O_8$, identical with that found in Indian cotton flowers, the formula for which was formerly considered to be $C_{16}H_{12}O_8$, and is now abandoned. A new colouring matter hibiscetin, m.p. 340°, and giving a colourless acetyl compound was also found, and quercetin.

The flowers of *Thespasia lampas* are found to yield 0 6 per cent. of quercetin, with a small quantity of free protocatechaic acid.

Saccharane, a Definite Constituent of Caramel. F. Ehrlich. (*Annales Chim. Analyt.*, 1910, **15**, 27.) By heating sugar, *in vacuo*, in an oil bath to 200°C., extracting the residue with boiling MeOH until no more colouring matter is extracted; then redissolving the insoluble residue in water, filtering and evaporating to dryness *in vacuo*, an amorphous tasteless product is obtained, soluble in water, not precipitated by lead acetate, which is stated to have the definite chemical formula, $C_{12}H_{22}O_{11} \cdot 2H_2O$, and to possess an intense and constant tinctorial power. This has been named saccharane. It is proposed to employ saccharane as the standard for determining the colour value of commercial caramel, expressing the degree of colouring power in terms of saccharane. Maltose, when similarly treated,

gives a product of less tinctorial power. Dextrose, fructose, and starch produce no saccharane. The yield from sugar is about 20 per cent.

ESSENTIAL OILS.

Aegle marmelos Leaves, Essential Oil of. — Ritsema. (*Jaarboek Depmt. Land. Ned. Ind.*, **1908,** 52; *Schimmels' Report*, April, **1910,** 15.) The leaves yield about 0 6 per cent. of pale yellow oil; sp. gr. 0 856 at 25°C.; a_D+10 71°; saponification value 10 6. When left exposed to the air for about 15 minutes, it loses about 8 per cent. of its weight and becomes turbid. On longer standing, it again becomes clear but viscous. Dextro-limonene was identified as a constituent of the oil.

Ajowan Fruits, Constituents of the Terpenes of Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 14.) The terpenes of ajowan oil, which have been named collectively "Thymene," are found to consist mainly of para-cymene; α-pinene, dipentene and γ-terpinene are also present. No phellandrene occurs in the oil of the fruits, although it is present in ajowan herb oil.

Artemisia nana, Essential Oil of, a New Source of Laevocamphor. T. Whittelsey. (*Chem. Zentralb.*, 1909, **2,** 2, 160.) One of the North American "sage brushes," probably *Artemisia nana*, yields about 1·2 per cent. of bluish-yellow essential oil, which is rich in laevocamphor, so that it deposits crystals when cooled in a freezing mixture; and when about half the oil is fractionated off, the residue sets to a solid on cooling. The amount of laevocamphor present, determined as semicarbazide, is over 44 per cent. of the oil. The oil of another sage brush, *Artemisia tridentata*, appears to contain no camphor.

Artemisia herba-alba, var. Densiflora, Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 25.) Oil distilled from a less mature parcel of material than that previously examined (*Y.B.*, **1909,** 26) differs markedly in characters, being dextro-rotatory, a_D + 14°5′; sp. gr. 0·8994 at 15°C; η_{D20}. 1,46684; acid value, 4 6; ester value, 35·0; acetyl value, 163·3; solubility in 70 per cent. alcohol 1 : 1·8 with separation of paraffin. (See also *Y.B.*, **1905,** 44.)

Bay, Essential Oil of (Myrcia acris.) (*Evans' Analyt. Notes*, **1909,** 12.) Of six samples examined three were low in phenolic

constituents; one containing only 17 per cent. and showing the low sp. gr. 0·901. Three good oils gave from 60–63 per cent. of phenols; sp. gr. from 0·971 to 0·974.

Bay, Essential Oil of, from Fiji. (*Schimmels' Report*, Oct., **1909**, 27.) Two samples of Fiji bay oil, received from the Imperial Institute, were found to be abnormally poor in phenols, containing only 23 and 24 per cent., whereas normal oils contain 60 per cent. This may be due to the loss of the heavy oil by careless distillation. The sp. gr. were 0·9893 and 0·9605; a_D − 1° and −2°10′. (See also *Y.B.*, **1904**, 122.)

Bergamot, Essential Oil of. (*Evans' Analyt. Notes*, **1909**, 14.) Three out of eleven samples examined were adulterated: two with lemon oil, and one with turpentine. One of these contained only 16·6 per cent. of esters, calculated as linalyl acetate.

Bergamot, Essential Oil of, Adulterated. J. C. Umney. (*Chem. & Drugg.*, 1909, **75**, 411.) Samples of pure bergamot oil of 1909 production have a slightly higher a_D than those of previous years, but the other characters are normal.

Specific gravity at 15°C., 0·883 to 0·884; rotation (100 mm.), +17°; esters, 40·6 per cent. to 41·5 per cent.; non-volatile matter, 5·2 per cent.

Any oil having the rotation of over +20° should be rejected, and over +18° should be viewed with grave suspicion. Moreover, any oil yielding a non-volatile residue of under 5 per cent. after drying for two hours on a water-bath, should be deemed impure and sophisticated with bodies yielding practically no residue. Several oils have been met with of notably low odour value, although the apparent linalyl acetate value was normal. These were evidently adulterated. Such oils had characters resembling the following:—

Sp. gr. at 15°C., 0·887; a_D +19° to +22°; esters, 41·0 to 41·5 per cent.; non-volatile matter, 4·4 to 4 5 per cent.

The residues of these oils are abnormally low, and indicate the dilution with bodies leaving practically no residue; and from the physical character and the odour it seemed likely that they were mixed with orange oil or its terpene and terpineol acetate. The presence of the terpineol acetate was determined without difficulty by saponification, the lilac odour of terpineol being then sufficiently marked to be observed, even through the powerful odour of linalol.

Among the "synthetic" products actually sold commercially for the purpose of giving fictitious ester value to essential oils is terpineol acetate, which has the sp. gr. about 0·960 at 15°C.; a_D, *nil*; boiling range, 220° to 230°C. Commercial samples estimated approximately 90 per cent. of terpineol acetate. This is now being supplied by manufacturers abroad, with instructions for mixing, and a statement that an addition of 1 per cent. to the particular oil will raise the indicated ester percentage of the oil, calculated as linalyl acetate, by a certain proportionate amount. Among the bodies that are being thus offered are ethyl citrate, ethyl benzoate, and benzyl benzoate, the use of which in raising the apparent ester percentage is obvious.

Bergamot, Essential Oil of. Detection of Ethyl Citrate as an Adulterant of. O. Wiegand and K. Ruebke. (*Zeits. angew. Chem.*, **1910,** 1018; *Apoth. Zeit.*, 1910, **25,** **435.**) Five Gm. of the oil is heated in a metal capsule, on the water-bath, to constant weight, which will require 4 to 5 hours. The residue is dissolved in alcohol, transferred to a saponifying flask and saponified in the usual manner with alcoholic N/2 KOH. Excess of KOH is then titrated back with N/2 H_2SO_4, with phenolphthalein indicator. Titration is best performed on the saponification liquid direct, without dilution with water. The saponification value of the residue of pure bergamot is between 136 and 180; and that of oil adulterated with ethyl citrate, markedly higher. By the addition of 2 per cent. of ethyl citrate to pure bergamot oil, the weight of the residue is increased by 1·7 per cent. and the saponification number by 94 7 per cent. Since 1 of triethyl citrate is equivalent to 2 13 of linalyl acetate, it is evident that the amount of the former to be added to materially increase the apparent ester value would be readily detected by this test. Pure bergamot oil gives a perfectly clear solution with alcoholic KOH solution; so if a turbidity be observed during the first part of the process, the presence of the sparingly soluble $K_3C_6H_5O_7$ may be suspected.

The presence of citric acid may be confirmed by the ordinary Ca method. Five Gm. of the oil, or 2 Gm. of its evaporation residue, is saponified with alcoholic KOH; the liquid is diluted with water, acidified with HCl, and the alcohol driven off on the water-bath. The cold liquid is then shaken out with ether, and the aqueous portion filtered. The filtrate is made

very faintly alkaline with NaOH, and a few drops of $CaCl_2$ solution are added. On warming calcium citrate will be precipitated. The presence of the acid may be confirmed by Denigès' method, which is more delicate than the above. Ten c.c. of the liquid is strongly shaken up with 1 to 1·5 Gm. of PbO_2 and treated with 2 c.c., of $HgSO_4$ solution (HgO, 5 Gm.; H_2SO_4, 20 c.c.; water to 100 c.c.), then filtered. Five c.c. of the filtrate is heated to boiling and treated drop by drop with agitation with 2 per cent. $KMnO_4$ solution until the colour is no longer discharged. In the presence of citric acid, a white or yellowish precipitate or turbidity appears soon after adding the first drops.

Bergamot, Essential Oil of, Adulterated with Terpinyl Acetate. (*Schimmels' Report*, April, **1910**, 59.) Terpinyl acetate, previously found by J. C. Umney as an adulterant of bergamot oil, has been met with in two instances. Both these oils had a high sp. gr., 0 8966 and 0 898 at 15°C.; and the evaporation residues, 4 and 3·3 per cent., was unduly low. The differences observed in the characters and amounts of the fractions obtained by distilling under 3 mm. pressure, at once distinguishes the sophisticated oil from the genuine article. It was also observed that the time necessary for complete saponification is much shorter with pure oils than with those containing terpinyl acetate.

Bergamot Oil, Limit for Optical Rotation of. J. C. Umney. (*C. & D.*, 1909, **75**, 411); W. H. Simmons (*ibid.*, 487, *Schimmels' Report*, April, **1910**, 60). Umney would suspect all oil of bergamot with α_D exceeding +18°C. Simmons does not agree, having met with pure oil with the α_D + 20 to + 24°. Schimmels concur with the latter and regard Umney's figure as too low.

Birch Buds, Essential Oil of. (*Schimmels' Report*, Oct., **1909**, 28.) The oil was balsamic, yellow, and separated paraffin on cooling to 8°C., completely congealing at 5°C. Sp. gr., 0·973 at 15° C.; α_D – 5°34′; $\eta_{D26°}$ 1,50153; acid value, 2·8; ester value, 51·4; acetyl value, 150. (See also *Y.B.*, **1905**, 48.)

Cajuput, Essential Oil of. (*Evans' Analyt. Notes*, **1909**, **16**.) Five specimens examined were all satisfactory. Sp. gr. 0·9185 to 0·922; α_D – 1°20′ to – 2°20′; cineol 45 to 57 per cent.; solubility in alcohol 80 per cent., 1 : 1 to 1 : 2.

Camphor, Determination of, in Camphor Ointment. (*J.*

Pharm. Chim., 1909, **30,** 491.) Ten Gm. of the ointment, in a graduated 100 c.c. flask, is gently heated with absolute EtOH; when the fats have melted, the mixture is well agitated. The temperature of the liquid is then allowed to fall to 15°C. and the volume is adjusted to 100 c.c. by the addition of more absolute alcohol. A portion of the liquid is then filtered and its optical rotation determined in a 200 mm. tube. The amount of camphor is calculated from the formula: $[a]_D = \frac{100 \times a}{1 \times c}$, the specific rotation of camphor being $[a]_D = + 43°$.

Camphor, Determination of, in Spirit of Camphor. E. Deussen. (*Archiv. der Pharm.*, July 31, **1909,** 307.) Five Gm. of the spirit of camphor to be tested is placed in a 50 c.c. Erlenmayer flask. Twenty Gm. of a cold saturated aqueous solution of Am_2SO_4 is added, and then 30 Gm. of water, rotating the flask. The flask is closed with a cork; shaken to break up the separated camphor, and placed for about twelve hours in a refrigerator. The liquid is then filtered through a smooth filter of 7 cm. diameter, and the camphor washed with 70 to 90 Gm. of water so as to collect it at the point of the cone. The wash water is tested with $BaCl_2$, stopping the washing when turbidity appears only after two seconds. The camphor is now pressed on the top with a bent spatula so as to form a cone. The filter is now covered with a watch glass and set aside, while a card, the size of a post-card, is weighed together with a suitable watch glass. The camphor is now spread on a porous tile with a nickel spatula in a moderately thin layer. This is allowed to stand for one minute—covered with a watch glass of 10 to 12 cm. diameter —when it is collected on the tared card, covered with the tared watch glass, and weighed at once.

Camphor from Leaves of Camphor Tree. — Cayla. (*J. Agric. trop.*, 1910, **10,** 8.) Leaves of Japanese camphor trees cultivated at Selangor have yielded at least 1 per cent. of camphor which was accompanied by relatively little oil. The time required for the exhaustion of the leaves, 3 hours, compares favourably with that occupied by distilling the wood; 24 hours being allowed in Formosa. The author considers that the leaves will prove to be, in the future, an important source of camphor. Leaves and shoots of the camphor tree cultivated in Jamaica gave only 0·23 per cent. of camphor and 0·28 per cent. of oil.

In Antigua the growing parts yielded 1·2 per cent., and the wood 0·4 per cent. (See also *Y.B.*, **1907, 30.**)

Camphor, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 17.) Four lots ranged in sp. gr. from 0·888 to 0·891, and in a_D from + 23° to + 27°.

Caraway, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 18.) Five specimens ranged in sp. gr. from 0·9095 to 0·913, and in a_D from + 77° 30′ to + 80°.

Cassia, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 19.) Five samples had a cinnamic aldehyde value of 80–85 per cent. Of three other specimens which had been stored for a number of years, one had an apparent aldehyde value of 93 per cent., although it gave a turbid 1 : 10 solution with alcohol 70 per cent.; the others gave 80 and 75 per cent., respectively of cinnamic aldehyde.

Cedar Wood, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 20.) Two samples had the sp. gr. 0·940 and 0·942, with the a_D—44°; two others, the sp. gr. 0·963 and 0·979, with a_D — 18° and —36°.

Cedrus libani, Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 132.) The oil previously reported on as being derived from true Lebanon cedar wood was not derived from that tree, but from a species of *Juniperus* Authentic samples of true cedar wood have now been distilled. The yield is 3·5 per cent. of a lemon yellow fragrantly balsamic oil; sp. gr. 0·9427 at 15°C.; a_D + 80°20′; η_D 1,51254; acid value, 0·5; ester value, 3·0; acetyl value, 19·8; solubility in alcohol 95 per cent., 1 : 5 to 1 : 6.

Celery Fruits, Constituents of Essential Oil of. (*Schimmels' Report*, April, **1910,** 32.) Celery oil contains dextrolimonene, 60 per cent.; dextroselinene, 10 per cent.; alcohols, from 2·5 to 3 per cent.; sedanolide, 2·5 to 3 per cent.; sedanonic anhydride, 0·5 per cent. Selinene is a new sesquiterpene, forming a crystalline hydrochloride. It is probably identical with the hydrocarbon $C_{15}H_{24}$ described by Ciamicean and Silber. (*Y.B.*, **1907,** 192.)

Celery Fruit, Essential Oil of. J. Swenholt. (*Midland Drugg.*, 1910, **44,** 220.) The oil distilled from celery seed was

collected in two fractions; a lighter portion distilling freely in the first 20 minutes; and a heavier fraction requiring several days of interrupted working for its complete distillation. These two fractions separately and the oil produced by mixing them in the proportions in which they occurred had the following characters:—

	Light Oil.	Mixed Oil.	Heavy Oil.
Colour	Colourless	Lemon yellow	Dark yellow
Odour	Limonene-like	—	Celery
Sp. gr. at 20°	0·8408	0·8596	0·8774
a_D in 50 mm. tube at 20°C.	+46°57′2″	+40°0′24″	+32°52′48″

After standing for eight months the light oil still had a faint celery odour, whereas the heavy oil had lost its agreeable odour and smelled like a resinified turpentine oil. The mixed oil had a strong and pleasant celery odour. The specific gravities of all three oils were re-determined:—

	Light Oil.	Mixed Oil.	Heavy Oil.
Specific gravity at 20° C.	0·8528	0·8726	0·9690

In the determination of the chemical constants, only the alcohol and ester contents were ascertained. The acid number of the light oil is so small as to be practically negligible. The heavy oil has a small quantity of acid, but the amount could not be exactly determined. The peculiar behaviour of the heavier oil indicates that it contains a substance which is affected by alkali; with this it gives a pink colour, which rapidly disappears. The light oil when freshly distilled has a saponification value of 9·4 to 9·59; that of the heavier oil is 62·6 to 68·4. The acetyl value of the fresh light oil is 14·9 to 21·8; and that of the heavier oil 89·1 to 91·1. The acetyl value of the saponified oil is lower than that of the fresh. When saponified the oil loses its characteristic odour.

Chamomile, Essential Oil of. (*Evans' Analyt. Notes,* **1909,** 20.) Five oils distilled from English flowers had the following characters; sp. gr. 0·905 to 0·9075; solubility in alcohol 70 per cent., 1 : 5 to 1 : 10,

Chrysanthemum sinense, var. japonicum, Essential Oil of. S. Keimatsu. (*P. J. Jap.*, **1909,** 1; *J. Pharm. Chim.*, 1909, **30,** 110.) The oil known in Japan as "Rionō-kiku" is obtained in a yield of 0·8 per cent. It is a yellowish brown liquid which deposits considerable quantities of isocamphor on cooling. It contains laevocamphene as well. After crystallizing out a part of the isocamphor, the residual oil had the sp. gr. 0·9394 at 15°C.; a_D − 12°4′; acid value, 0; ester value, 0. (See also *Y.B.*, **1900,** 171.)

Cinnamon Bark, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 21.) The figures obtained for this oil during 1909 were: Sp. gr., 1·022 to 1·034; a_D − 03°3′ to 0°44′; aldehyde, 73 to 78 per cent.; phenols, 10 to 16 per cent. One sample from Seychelles gave abnormal figures, due to faulty distillation; sp. gr., 0·962; a_D − 5°42′; aldehyde, 40 per cent.; aldehydes, 10 per cent.

Cinnamon Leaf, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 21.) Three specimens varied in sp. gr., from 1·010 to 1·047; phenols, from 72 to 88 per cent.; solubility in alcohol 70 per cent. from 2 : 1 to 1 : 2.

Cinnamonum mercadoi, Philippine, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, 1909, **4,** 114; *Schimmels' Report*, Oct., **1909, 40.**) The bark of this cinnamon, occurring in many parts of the Philippines, where it is known as "Calingag," yields about 1·04 per cent. of yellow oil, with a sassafras odour; sp. gr., 1·0461, 30°/4°C.; $a_{D30°}$ + 4°; $\eta_{D30°}$ 1,5270. It contains no aldehydes, and is found to consist mainly of safrol.

Citronella, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 22.) Two consignments from Java had the sp. gr. 0·8897 and 0·8795; a_D − 2°45′ and − 3°20′; geraniol 88·4 and 89·0 per cent.; solubility in alcohol 80 per cent., 2 : 3. Five commercial samples of the oil ranged in sp. gr. from 0·894 to 0·904; a_D − 2°30′ to − 16; geraniol equivalent from 59·5 to 60·56 per cent.

Citronella Oil, Geraniol Standard for. J. C. Umney. (*Perf. Record*, 1910, **1,** 4. (*Schimmels' Report*, April, **1910, 39.**) E. J. Parry. (*Amer. Perf.*, 1910, **4,** 211.) J. C. Umney reverts to the question of the importance of the determination of geraniol as being the most reliable factor for the valuation of citronella oil. He suggests 60 per cent. as a minimum geraniol content.

Schimmels', while defending their "raised Schimmels' test" (*Y.B.*, **1904**, 61), admit the value of the geraniol determination, and would welcome the adoption of Umney's limit. The only drawback to the test is that it requires to be applied by a skilled chemist. Parry suggests that the geraniol content of citronella oil should be taken directly as indication of its commercial value, as, for instance, cinnamic aldehyde is taken to indicate the value of cassia oil. The oil would then be sold on its declared geraniol content. The best Ceylon citronella oils contain from 77 to 83 per cent. of total geraniol.

Cloves, Essential Oil of. (*Evans' Analyt. Notes*, **1909**, 22.) Clove oil distilled in Liverpool had the sp. gr. 1·049, and a_D up to $-1°$; eugenol 85 to 87 per cent. by absorption with KOH solution 1 : 20.

Cloves, Essential Oil of, Fictitious. (*Schimmels' Report*, April, **1910,** 43.) A spurious "clove oil" composed mainly of fractions of camphor oil, had the following characters: sp.gr., 1·048 at 15°C.; $a_D - 4°58'$; phenol content, 70 per cent.; soluble in 70 per cent. alcohol 1 : 1 3, cloudy with more. Safrol was present.

Cloves, Essential Oil of, New Constituents in. H. Masson. (*Comptes rend.*, 1909, **149,** 630–795.) Methyl-normal-amyl-carbinol, furfuralcohol, methyl-normal-heptyl-alcohol, benzyl-alcohol, *a*-methyl-furfurol, *a*-dimethyl furfurol and methyl salicylate have all been isolated from the non-eugenolic portion of clove oil.

Cloves, Seychelles, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 22.) A specimen of the oil distilled in Seychelles had the sp. gr. 1 0487; $a_D - 1°34'$; eugenol, 86 per cent. The aroma was poor.

Copaiba, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 25.) The following figures were obtained in the course of the distillation of a large number of consignments of the different varieties of copaiba balsam indicated. *Maranham:* Twenty samples ranged in sp. gr. from 0·898 to 0·904; a_D $-1°30'$ to $-21°40'$. *Maracaibo:* Six samples varied thus: sp. gr., 0·900 to 0·903; a_D $-6°0'$ to $-7°0'$. *Para:* Twenty-one samples ranged, in sp. gr. from 0·886 to 0·898 and in a_D from $-18°30'$ to $-31°0'$. *Cartagena:* Two samples gave sp. gr., 0·896 and 0·895; a_D $-30°0'$ and $-40°0'$. *Bahia:* Seven lots gave sp. gr. from 0·898

to 0·909; a_D from − 2°42′ to − 28°. Para copaiba furnishes oils with lower sp. gr. and higher optical rotation than other varieties. The balsam now arriving is much thicker than formerly, and the yield of oil on distillation is consequently less. The a_D of some of the Maranham copaiba oils is lower than before observed with this variety.

Coriander, Constituents of, Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 47.) A further examination of coriander shows it to have the following constituents :—Dextro-a-pinene; iso-a-pinene; β-pinene; phellandrene (?); cymene; dipentene; a-terpinene; γ-terpinene; terpinolene (?); η-decyclic aldehyde; dextro-linalol; geraniol; laevo-borneol; and acetic esters of these alcohols.

Crithmum maritimum, Essential Oil of. M. Delépine. (*Comptes rend.*, 1910, **150,** 161.) Essential oil of samphire contains dextro-pinene, paracymene, dipentene, methyl thymate, dill-apiol, and small amounts of other unidentified constituents. Thymol combined as ester has not hitherto been recorded as a natural plant constituent. (See also *Y.B.*, **1909,** 30.)

Cubebs, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 28.) Of sixteen samples examined some showed a slightly lower optical rotation than usual: the a_D ranged from − 26° to − 31°. Some variation in solubility was also noted, some samples requiring eight volumes of 90 per cent. alcohol to give a clear solution.

Cummin, Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 49.) The hydrocarbon fractions of cummin oil consist mainly of paracymene with small quantities of dextro and ι-a-pinene; β-pinene; β-phellandrene, and dipentene. Cuminal was the chief aldehyde present, accompanied by a small amount of an allied hydrogenated aldehyde. The chief alcohol was cuminol, with a small amount of a substance distilling at 90–107°C. under 3 mm.

Cypress Camphor identical with Cedar Camphor. (*Schimmels' Report*, April, **1910,** 47.) It was formerly stated that cedar camphor and cypress camphor, although similar in other respects, differed in optical rotation. It is now found, however, that both are dextro-rotatory and both are converted into laevo-

rotatory hydrocarbons by reducing agents. The two camphors are therefore identical.

Daucus carota Fruits, Essential Oil of. E. Richter. (*Archiv. Pharm.*, 1909, **247,** 391.) The oil examined was bright golden yellow ; sp. gr., 0 9439 ; $a_D - 13°38'$. It contains dextro-pinene and laevo-lemonene ; a new compound, *daucol,* $C_{15}H_{26}O_2$, probably a glycol, which is not acetylized by acetic anhydride ; a mixture of sesquiterpenes ; a trace of an aldehyde ; isobutyric and palmitic acids ; but no cineol, as found by Landsberg. (*Y.B.*, **1889,** 187 ; **1890,** 41.)

Dill, Essential Oil of, Adulterated with Fennel Oil. (*Schimmels' Report,* April, **1910,** 47.) A Galician sample of dill oil having the sp. gr. 0 9425 at 15°C. ; $a_D + 48°16'$; $\eta_{D20°}$ 1,50775 ; was not absolutely soluble in alcohol 80 per cent. Since it was found to contain considerable quantities of anethol, fennel oil was shown to be the adulterant.

Dipterocarpus grandifluus, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, **1909,** 121 ; *Schimmels' Report*, Oct., **1909,** 136.) The oil reported on by Clover (*Y.B.*, **1907,** 177) has been further examined. The balsam, whether distilled *in vacuo* or under ordinary pressure, yields an oil which contains crystalline acids. A sesquiterpene was detected in the fraction boiling 128–131°C. under 13 mm., sp. gr. 0 9104 30°/4°C. $a_{D30°} + 116\ 4°$; b.p. 118–119° under 8 mm. It had no free acid nor ester.

Elemi, Manila, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, 1909, **4,** 93 ; *Schimmels' Report*, Oct., 1909, 54.) Contrary to the statement of Tschirch, who describes Manila elemi as being hard or soft, the author, from observations on the spot, states that it is always soft when fresh. It only hardens after prolonged exposure. It flows from the trunk of the tree, chiefly when the new leaves are being developed. At other times it yields no oleoresin. Fully grown healthy trees yield 4 or 5 kilos per annum ; one large tree gave as much as 22 kilos in two months. Of sixty-two samples of oil distilled in the Tabayas district only two contained dextrolimonene. The other samples contained phellandrenes. These are stated to be a and β–phellandrene, and a third, having a higher boiling point, 175–176°C. under 760 mm. ; sp. gr. 0·8375, 30°/4°C. ; $a_{D30} + 82{\cdot}4°$; yielding a nitrite, m.p. 121°C. Ninety per cent. of all the samples examined contained phellandrene. The optical rotation

of the elemi terpenes was found to diminish markedly under the influence of sunlight. Thus, an a-phellandrene having the a_D + 134·5° showed only + 124·7° after ten hours' exposure to the sun.

Eruca sativa Seeds, Constituents of. L. Halset and J. F. Gram. (*Apoth. Zeit.*, 1910, **25,** 404). If the powdered seeds are first macerated in cold water, then distilled, they yield an essential oil containing N and S. If distilled at once, without previous treatment, they yield no oil. They also again give essential oil when treated with white mustard seeds and water, after the first maceration and distillation. It is evident, therefore, that the oil is formed by the action of a ferment. The seeds are also rich in albuminoids.

Essential and Fixed Oils, Refractive Index of. T. F. Harvey and J. M. Wilkie. (*Chem. & Drugg.*, 1910, **76,** 442). Practical instructions for correctly determining the refractive index of fluids are followed by tables of observations on fixed and volatile oils.

Essential Oils of the B.P. Proposed Monographs for. C. A. Hill and J. C. Umney. (*Pharm. J.*, 1910, **30,** 177.) The following are brief abstracts of a series of monographs suggested for discussion, with a view to improving the official characters and tests to be included in the forthcoming B.P. Specific gravities are recorded at 15·5°C., optical rotation is recorded at 20°C., and refractive indices are recorded at 25°C., unless otherwise stated.

Oleum Anethi.—The oil distilled from dill fruit (*Peucedanum graveolens*). Sp. gr., 0·900 to 0·910 ; a_D, from + 70° to + 75° ; η_D, 1,483 to 1,488. It should be soluble in three volumes of 90 per cent. alcohol.

Note.—The official monograph for dill fruit must be drafted to exclude Indian fruits (*Peucedanum sowa*).

Some normal distillates of dill fruit have a lower sp. gr. than 0·900, but since the oil is for medicinal purposes and the carminative principle is carvone, a high proportion of the latter should be ensured by the minimum limit of sp. gr. suggested. A high specific gravity should put the analyst or user on his guard for admixture with caraway oil.

Oleum Anisi.—The oil distilled from anise fruit (*Pimpinella anisum*) or from the fruit of the star anise (*Illicium verum*), the latter being that used almost entirely in this country. Specific

gravity at 20° [compared with water at 15·5°], 0·975 to 0·990 (rising on keeping); a_D 0 to – 2°; η_D 1·552 to 1·558. It congeals, when stirred, at about 10°C., and should not melt again at a temperature below 15°C. At least 80 per cent. should distil between 225° to 235°C. Soluble in 90 per cent. alcohol 1 : 3.

Oleum Anthemidis.—The oil distilled from the flowers of the Roman chamomile. When freshly distilled it is a blue liquid gradually becoming greenish to brownish-yellow under the influence of air and light. Sp. gr., 0·905 to 0·915; a_D + 1 to + 3°; η_D about 1·445; soluble in less than its own volume of 90 per cent. alcohol.

Oleum Cajuputi.—A green or bluish-green liquid. Sp. gr., 0·919 to 0·930; a_D not more than – 2; η_D 1·460 to 1·467. When 10 c.c. of the oil are mixed in a freezing mixture, with 4 to 5 c.c. of H_3PO_4, sp. gr. 1·750, and pressed in a piece of fine calico between folds of blotting paper, under a strong press, and the pressed cake decomposed by water in a 25 c.c. measure, it should yield at least 4·5 c.c. of cineol.

Oleum Carui.—The rectified oil distilled from caraway fruit. Sp. gr. 0·910 to 0·920; a_D + 75° to + 82°; η_D 1·485 to 1·497. It should be soluble in an equal volume of 90 per cent. alcohol and in ten volumes of 80 per cent. alcohol. When fractionally distilled from a Wurtz flask at the rate of one drop per second, at least 50 per cent. should distil above 200°C.

Oleum Caryophylli.—Colourless or pale yellow when recent, darkening with age and on exposure to air. Sp. gr., 1·047 to 1·070; η_D 1,528 to 1,540; soluble in three volumes of 70 per cent. alcohol. An alcoholic solution yields a blue colour with test solution of Fe_2Cl_6. If 10 c.c. of the oil be heated and well shaken with 100 c.c. of a 5 per cent. aqueous solution of KOH on a water-bath in a flask with neck graduated in tenths of 1 c.c., and then allowed to stand, the uncombined oil driven into the neck should measure not more than 2 c.c., showing the presence of at least 80 per cent. of eugenol.

Oleum Cinnamomi.—The oil distilled from cinnamon bark. Yellow when freshly distilled, gradually becoming reddish. Soluble in three to four volumes of 70 per cent. alcohol. η_D 1·572 to 1·582; sp. gr., 1·025 to 1·040; a_D from – 0·5° to – 1 One drop dissolved in 5 c.c. of 90 per cent. alcohol and one drop of test solution of Fe_2Cl_6 added should afford a pale green, but not a blue or brown colouration (absence of cinnamon-leaf oil and cassia oil). It should contain 55 to 75 per cent. of cinnamic

aldehyde as determined by the following test. Ten c.c. of the oils are added to 70 c.c. of 20 per cent. solution of Na_2SO_3 and a few drops of phenolphthalein test solution added, to give a well-marked pink colouration. The mixture is heated on a water-bath, well shaken, and neutralized from time to time by the addition of a 10 per cent. solution of acetic acid, until the liquid develops no further pink colouration, the time occupying from thirty to forty-five minutes. The oily layer, which separates on standing, on cooling to 15°C., should measure not more than 4·5 c.c. nor less than 2·5 c.c., showing the presence of 55 to 75 per cent. of cinnamic aldehyde. (See also p. 376.)

Oleum Copaibae.—Colourless or pale yellow. Sp. gr., 0·900 to 0·910 ; a_D $-7°$ to $-35°$; η_D 1·494 to 1·500 ; distils between 250° to 275°C. One c.c. of the oil dissolved in 5 c.c. of glacial acetic acid, and four drops of HNO_3 added, should not develop more than a faint violet colouration. (Absence of gurjun oil.)

It is suggested that a complete inquiry be instituted into the relative values of the oil and the resin of copaiba with a view to the possible omission of the present monograph, and to the framing of a satisfactory one for oleoresin of copaiba.

Oleum Coriandri.—Sp. gr., 0·870 to 0·885 ; a_D $+8°$ to $+14°$; η_D about 1·463 – 1·467. Soluble in three volumes of 70 per cent. alcohol.

Oleum Cubebae.—A colourless to pale-green or greenish-yellow liquid. Sp. gr., 0·910 to 0·930 ; a_D $-25°$ to $-40°$; η_D 1·486 to 1·500. At least 80 per cent. of the oil should distil between 250° and 280°.

Oleum Eucalypti.—The rectified oil distilled from the fresh leaves of *Eucalyptus globulus*, *Eucalyptus dumosa*, and other species. Colourless or pale yellow. Sp. gr., 0·910 to 0·930 ; a_D $+10°$ to $-10°$. Soluble in five volumes of 70 per cent. alcohol. It should contain at least 55 per cent. by volume of cineol when tested according to the process described under *Oleum Cajuputi.*

If 1 c.c. of the oil be mixed with 2 c.c. of glacial acetic acid and 5 c.c. of petroleum ether, and 2 c.c. of a saturated aqueous solution of $NaNO_2$ added, and the mixture gently shaken, no crystalline precipitate should form in the upper layer (exclusion of oils containing much phellandrene.)

Oleum Juniperi.—Colourless or pale yellowish green. Sp, gr., 0·862 to 0·890, increasing with age ; a_D $-3°$ to $-12°$; η_D 1·472 to 1·488. Soluble, when freshly distilled, in four

volumes of 95 per cent. alcohol, becoming less soluble with age.

Oleum Lavandulae.—The oil distilled from the flowers of *Lavandula vera*, cultivated in England, France, and other countries. Pale yellow or yellowish-green. Sp. gr., 0·883 to 0·900; a_D $-3°$ to $-10°$. Soluble in three volumes of 70 per cent. alcohol. The English oil should contain from 7 to 11 per cent. of esters, and the foreign oil not less than 30 per cent. of esters, calculated as linalyl acetate as determined by saponification with alcoholic potash.

Oleum Limonis.—The oil obtained by expression by various methods from fresh lemon peel. Sp. gr., 0·857 to 0·860; a_D $+58°$ to $+64°$; η_D 1·474 to 1·476. Should contain at least 3·5 per cent. of citral.

Oleum Menthae piperitae.—The oil distilled from the fresh-flowering peppermint, *Mentha piperita.* Rectified, if necessary, by re-distillation. Colourless, pale yellow, or greenish-yellow. Sp. gr., 0·900 to 0·920; a_D $-20°$ to $-35°$. Soluble in four volumes of 70 per cent. alcohol. Should contain at least 50 per cent. of total menthol, free and combined, determined by the acetylation process, and not less than 6 per cent. of esters, calculated as menthyl acetate, as determined by saponification with alcoholic KOH.

Oleum Menth. viridis.—The oil distilled from fresh-flowering spearmint, *Mentha viridis* or *Mentha crispa.* Colourless, pale yellow, or greenish-yellow, becoming darker on keeping. Sp. gr., 0·925 to 0·940; a_D $-30°$ to $-50°$. Forms a clear solution with an equal volume of 80 per cent. alcohol, the solution becoming turbid on further dilution. Soluble in three volumes of 90 per cent. alcohol.

Oleum Myristicae.—The oil distilled from nutmegs and subsequently rectified. Colourless or pale yellow. Sp. gr. 0·870 to 0·920; a_D $+13°$ to $+30°$; soluble in three volumes of 90 per cent. alcohol; η_D 1·474 to 1·484. When evaporated on a water-bath it should not leave a residue that crystallizes on cooling.

Oleum Pimentae.—Yellow or reddish-yellow when recently distilled, becoming darker on keeping. Sp. gr., 1·040 to 1·055; a_D 0 to $-4°$; η_D 1·508 to 1·535. Soluble in three volumes of 70 per cent. alcohol. It should contain not less than 65 per cent. by volume of eugenol when tested as described under *Oleum Caryophylli.*

Oleum Pini.—The oil distilled from the fresh leaves of *Pinus sibirica.* Colourless, or nearly so. Sp. gr., 0·900 to 0·920; a_D − 32° to − 42°; η_D about 1·474. It should contain 30 to 40 per cent. of esters, calculated as bornyl acetate, as determined by saponification with alcoholic potash. The substitution of this oil for that of *Pinus pumilio* is suggested.

Oleum Rosae.—Synonym: Otto of Rose. The oil distilled from the fresh flowers of *Rosa damascena.* A pale yellow or yellowish-green crystalline mass, semi-solid at ordinary temperatures. Sp. gr. at 30° (compared with water at 15·5°C.), 0 855 to 0·862; a_D − 2° to − 4°; η_D at 25°, 1·456 to 1·465; m.p., 20° to 22·5°C.

Oleum Rosmarini.—Colourless or pale yellow. Sp. gr., 0·900 to 0·920; a_D 0 to + 15; η_D 1·463 to 1·473. Soluble in one volume of 90 per cent. alcohol and in five to ten volumes of 80 per cent. alcohol. It should contain not less than 10 per cent. of total alcohols, calculated as borneol, as determined by the acetylation process, and at least 2 per cent. of esters, calculated as bornyl acetate, as determined by the saponification process.

Oleum Santali.—The oil distilled from the wood of *Santalum album.* Pale yellow in colour, or nearly colourless, somewhat viscid in consistence. Sp. gr., 0·973 to 0·985; a_D − 16° to − 20°; η_D 1·498 to 1·508. Soluble in six volumes of 70 per cent. alcohol at 20°C. Should contain not less than 90 per cent. of total alcohols, calculated as santalol, $C_{15}H_{24}O$, when determined by the acetylation process.

Oleum Sinapis Volatile.—Obtained by distillation from black mustard seeds deprived of fixed oils and macerated in water for several hours. Sp. gr., 1·018 to 1·025; distils between 148° to 156°C. Should contain not less than 92 per cent. of allyl isothiocyanate; determined by the following process. Weigh accurately about 1 Gm. of the oil, and add sufficient Et_2O to make 50 c.c. contain exactly 1 Gm. of the oil. Of this solution transfer 5 c.c. to 100 c.c. flask, and add 30 c.c. of N/10 $AgNO_3$ and 5 c.c. of solution of AmOH. Heat on a water-bath at 80° for thirty minutes, shaking frequently; cool the contents to 15°, make up to exactly 100 c.c. with distilled water, and filter. To 50 c.c. of the filtrate add 4 c.c. of HNO_3 and a few drops of solution of ferric-ammonium sulphate, and add from a burette sufficient decinormal potassium thiocyanate solution to produce a permanent red colour. Not more than 5·6 c.c. should be

required. (One c.c. N/10 $AgNO_3$, corresponding to 0·00496 gramme of allyl isothiocyanate.)

Oleum Terebinthinae rectificatum.—The oil distilled from the oleo-resin (turpentine) obtained from *Pinus sylvestris* and other species, rectified by re-distillation. A limpid colourless liquid. Sp. gr., 0 860 to 0 870; η_D 1·465 to 1 480. Almost entirely distils between 156° and 180°C., leaving no appreciable residue.

The following oils are under the consideration of the General Medical Council:—

Oleum Aurantii.—Obtained by expression from the rind of the bitter orange, *Citrus aurantium*, var. *bigaradia* (and the sweet orange, *Citrus aurantium*). An orange-yellow liquid, having the characteristic odour of oranges and an aromatic bitter taste. Sp. gr., 0 847 to 0·853; a_D + 92° to + 98°; η_D 1·472 to 1 478. Rapidly deteriorates on exposure to air and light.

Oleum Gaultheriae.—Synonym: Oil of Wintergreen. Obtained by distillation from *Gaultheria procumbens. Oleum Betulae.*—The oil obtained by distillation from the bark of *Betula lenta.* These two oils being practically identical, one monograph will suffice. A colourless liquid. Sp. gr., 1·180 to 1·187; a_D 0° to − 1° η_D 1·537 to 1·539. Soluble in five volumes of 70 per cent. alcohol at 25°C. Should contain at least 99 per cent. of methyl salicylate as determined by the saponification process.

Oleum Foeniculi.—Distilled from the fruit of *Foeniculum vulgare.* Nearly colourless or pale yellow, having the characteristic odour of fennel and a pungent taste. Sp. gr., 0·960 to 0·990; a_D + 6° to + 20°; η_D 1·525 to 1·534. Soluble in an equal volume of 90 per cent. alcohol. The melting-point after solidification should not fall below + 4°.

Oleum Thymi.—Distilled from the fresh herb, *Thymus vulgaris.* Reddish-brown in colour. Sp. gr., 0·920 to 0·950; a_D slightly laevo-rotatory (for this test the oil must be re-distilled); η_D 1·480 to 1·495. Soluble in two volumes of 80 per cent. alcohol. It should contain not less than 25 per cent. of phenols. (thymol and carvacrol) when tested by the process described under *Oleum Caryophylli.*

SAPONIFICATION PROCESS.—From 2 to 5 grammes of the oil (according to the proportion of esters present) is heated for an hour with 25 c.c. of N/KOH and 25 c.c. of pure EtOH. The excess of potash is then titrated with N/H_2SO_4, and the number

of c.c. required deducted from the number of c.c. required by a blank experiment conducted under the same conditions without the oil. The number of c.c. of N/KOH absorbed multiplied by the ester equivalent and by 100, and divided by the number of grammes of oil taken, will given the percentage of esters in the oil.

Note.—If the oil contains free acid (which must be first ascertained by experiment), the amount of alcoholic potash required to neutralize must be deducted before the ester percentage is calculated.

ACETYLATION PROCESS.—Ten c.c. of the oil is heated for one and a half hours with 10 c.c. of acetic anhydride and 1 Gm. of anhydrous sodium acetate; 100 c.c. of water is added, and the aqueous layer removed by means of a separator, and the oil washed free from acidity with successive quantities of 100 c.c. of water, thoroughly shaking and allowing to separate. The acetylated oil is then dried by anhydrous sodium sulphate, and filtered. From 2 to 5 Gm. of the acetylated oil is then saponified with alcoholic potash, as described under the saponification process, and the percentage of alcohol calculated from the formula $\frac{x \times y \times 100}{w - 0{\cdot}042\ x}$, where x is the number of c.c. of normal alcoholic potash absorbed, y is the number of grammes of alcohol equivalent to 1 c.c. of normal potash, and w is the weight of the acetylated oil taken.

Essential Oils of the Pharmacopœia. E. Sachsse. (*Chem. and Drugg.*, 1910, **76**, 491.) *Oleum Anethi.*—Authentic oils often show a higher sp. gr. than 0·910. The higher limit of 0·915 is proposed.

Oleum Cajuputi.—The requirements of the present B.P. and the methods adopted for examining the oil are better than those now proposed, for it is unlikely that the method of determining the cineol content can be carried out by ordinary small laboratories. Should the cineol test, nevertheless, be made a standard, the method of proving it required by the present U.S.P. is better than that proposed by Hill and Umney.

Oleum Carui.—All Pharmacopœias which mention this oil do not require a higher sp. gr. than 0·905 to 0·915. The distilling process seems unnecessary, as all the other tests suffice to prove the good quality of the oil.

Oleum Cinnamomi.—Pure authentic oils are soluble in equal

parts of 80 per cent. alcohol which are not soluble in 3 to 4 volumes of 70 per cent. alcohol, and therefore the solubility test proposed is not considered to be correct, as it would to a certainty exclude a number of fine and pure cinnamon oils, Nor is it reliable, since oil of cassia is even more easily soluble. The solubility test should be entirely omitted. The sp. gr. proposed is correct, but it is suggested that the lower limit of cinnamic aldehyde should be reduced to 50 per cent.; pure distillates not having more are often met with.

Essential Oils of the Pharmacopœia. W. Naumann. (*Chem. and Drugg.*, 1910, **76**, 341.) *Eucalyptus Oil.*—If the cineol is the valuable constituent for medicinal purposes, a percentage of 70 per cent. would probably not be too low as a minimum.

Juniper-berry Oil.—If the cheap Hungarian "by-product" is useful medicinally, it is certainly necessary to reduce the specific gravity from 0·865 to 0·862; as it is, much oil is adulterated with turpentine to bring it up slightly. If the "pure" oil is required, the lower limit may be put down as very much higher than 0·860.

Lavender Oil.—A limit of ester percentage of 30 per cent. would exclude innumerable pure oils, some of the finest of which have as low a content as 22 per cent.

Peppermint Oil.—In view of the decreased solubility of American oils, it will probably soon be necessary to re-distil all oils if a solubility of one volume in four volumes of 70 per cent. alcohol be required.

Otto of Rose.—The value of the lower limit of 0·855 is questionable. In 1905 and 1906 many of the finest oils tested 0·853 to 0·854, and they have been known to go two or three points lower.

Rosemary Oil.—Many pure oils have a lower gravity than 0·900, and 0·895 or 0·897 should be allowed.

Essential Oils of the Pharmacopœia. J. H. Evans. (*Chem. and Drugg.*, 1910, **76**, 341.) The following data for the oils mentioned are mostly derived from essential oils distilled in the laboratories of the writer's firm; or in the case of exotic oils from analytical results obtained there.

Ol. Anethi.—The sp. gr. of authentic samples varies from 0·912 to 0·915. The suggested limit of 0·900 to 0·910 therefore appears to be too low, and a range of 0·902 to 0·915 would include all genuine oils with a high carvone content.

Ol. Anisi.—A range of sp. gr. from 0·978 to 0·990 has included all genuine oils.

Ol. Cajuputi.—Genuine oils with a sp. gr. 0·918, possessing a high cineol content, have been met with. This should be the minimum figure, rather than 0·919, as suggested. On the other hand, a sp. gr. of 0·930 seems unnecessarily high; 0·925 would include all normal oils.

Ol. Caryophylli.—Sp. gr. 1 070 appears to be unnecessarily high, and a range of 1·047 to 1·065 is suggested. Authentic oil with a lower phenol content than 84 per cent. has never been met with, and the average of a series of distillates works out at over 85 per cent.

Ol. Cinnamomi.—Fifty to 70 per cent. of cinnamic aldehyde and a sp. gr. of 1·020 to 1·035 would more nearly approximate the figures to be obtained from genuine oils than those suggested.

Ol. Copaibae.—The limit of a_D from $-10°$ to $-35°$ and sp. gr. of 0·898 to 0·910 would include oils obtained from normal samples of balsams of various varieties, which at present are of commercial interest.

Ol. Coriandri.—The sp. gr. 0·870 to 0·880 would cover all normal samples of this oil.

Ol. Cubebae.—The sp. gr. varies from 0·915 to 0·930.

Ol. Lavandulae.—The limit, 30 per cent. esters, for foreign oil is rather high. In some seasons, genuine oils of good quality as low as 28 per cent. have occurred.

Ol. Pimentae.—The sp. gr. does not rise above 1·050.

Ol. Rosae.—Sp. gr. 0·853 to 0·862 and η_D of 1·458 to 1·466 are the widest legitimate variations for authentic oils.

Ol. Santali.—The rotation of genuine oils frequently falls as low as $-15°$, and occasionally as low as $-14°$. The santalol content of genuine oils is not less than 92 per cent. Authentic oils which have been in stock for some time have required a temperature of 21°C. to yield a clear solution in six volumes of 70 per cent. alcohol.

Ol. Aurantii.—The combined monograph does not entirely cover the variations of the bitter and sweet oils. The sp. gr. of bitter oil rises to 0·854, and the a_D of the sweet oil extends to $+ 99°$. If a combined monograph is to be adopted, the sp. gr. should be made 0·847 to 0·854, and the a_D $+ 92°$ to $+ 99°$.

Essential Oils of the Pharmacopœia. Stafford Allen. (*Chem. and Drugg.*, 1910, **76**, 373.) *Oleum Anethi.*—The results

of the distillation of English grown dill indicate that the relative proportions between the carvone and terpenes vary somewhat from season to season, as weather conditions affect the ripening of the fruit. The sp. gr. 0·900 to 0·920, a_D + 70° to + 80°, solubility 1 in 3 of 90 per cent. alcohol, would cover normal dill oils, and within these limits a low sp. gr. with a high a_D points rather to a loss of sunshine than an abstraction of carvone. On the other hand, the sweetest oils drawn from fully ripe fruit have a high sp. gr. and a low a_D. The Indian fruit should be excluded, and a test for its detection in English dill oil provided. On distillation, the sp. gr., a_D, and odour of the latter fractions would point to the presence of dill apiol from E.I. fruit.

Oleum Anthemidis.—The a_D of blue English chamomile oil with the usual half-shadow polarimeter using a sodium flame cannot be determined, owing to the complete absorption of the monochromatic light by the column of blue oil, the low a_D (+ 1° to + 3°) rendering the usual methods of dealing with dark liquids unavailable.

Oleum Caryophylli.—Sp. gr. 1·047, admits some oils of excellent aroma, chiefly from Amboyna cloves, and therefore acceptable, but products having sp. gr. 1·070 are simply crude eugenol, and do not represent the true fragrance of good cloves. From 1902 to 1909 the maximum sp. gr. of the best oils was 1·056 and the minimum 1·048. These results represent over 400 separate bulks, each not less than 100 lb., and in many cases 500 lb., of oil. Strong clove oils with sp. gr. between 1·060 and 1·070 are distilled simply for eugenol, and are accordingly valued only on their phenol content. A eugenol content of 84 to 88 per cent., when estimated as described, is satisfactory for normal oil; of course, high gravity oils may contain 90 or even 94 per cent. of eugenol, but these are not for pharmacy.

Oleum Cinnamomi.—The practical results of distilling this oil are at variance with all the authorities as to sp. gr. and aldehyde content, but in spite both of this and its high price these oils are used where the delicate odour and flavour of true Ceylon cinnamon is appreciated. Sp. gr. of these never reaches the suggested limits, 1·025 to 1·040. The following sp. gr.—1·009, 1·008, 1·005, 1·003, 0·997, 0·994, 0·993, 1·018, 1·013—are the results obtained on the total distillate from fine Ceylon cinnamon, broken quills and chips. (See also p. 376.)

Oleum Juniperi.—The minimum sp. gr. limit might be 0·865 or even 0·870. A typical normal oil recently distilled from ripe

juniper berries furnished these figures: sp. gr. 0·8751, a_D $-10°$, solubility in 95 per cent. alcohol 1 in $2\frac{1}{2}$.

Oleum Myristicae.—The evaporation test should read: "When evaporated on a water-bath it should not leave a residue that crystallizes on cooling, nor should it be greater than 1 per cent."

Oleum Pimentae.—As sp. gr. limits exclude normal oil distilled from fine pimento, the remarks under Oil of Cinnamon seem to apply to this oil also. The most delicate flavoured oils are outside the limits of the Pharmacopœia, but the way inside is only too easy and obvious. The sp. gr. and eugenol content appear to be too high for some genuine oils.

Oil of Sandal.—The limits of the B.P. 1898 should be retained for determination of solubility at the temperature 15·5°C. In the acetylation process, as the direction "and the oil washed free from acidity," etc., is easier to read than to carry out, more detailed instructions might be added with advantage.

Essential Oils of the Pharmacopœia. T. F. Harvey and J. M. Wilkie. (*Chem. and Drugg.*, 1910, **76**, 421.) *Ol. Anthem.*—The a_D of four samples from authentic sources ranged from $+0·48°$ to $+0·74°$.

Ol. Cajuput.—In perfectly genuine samples an a_D of $-2°$ is often exceeded. Of twenty-one samples six showed rotations ranging from $-2·26°$ to $-2·84°$.

Ol. Copaibae.—The suggested sp. gr. 0·900 to 0·910 excludes many genuine oils; the lower limit should be 0·896, but 0·910 may be exceeded at times.

Ol. Eucalypt.—The suggested standard of 55 per cent. of cineol is reasonable.

Ol. Juniperi.—As the a_D of genuine oils from reputable sources frequently exceeds $-12°$, an upper limit of $-16°$ would be more reasonable. The minimum limit for sp. gr. should be 0·865.

Ol. Limonis.—The suggested limits for a_D are somewhat restrictive, $+56°$ to $+66°$ would include all genuine oils.

Ol. Santali.—As has already been pointed out, perfectly genuine oils may have a_D as low as $-13·32°$. Speaking only of well-authenticated samples, a requirement of anything more than 90 per cent. of santalol would probably prove ineffective.

Essential Oils, their Constituents and Adulterants, Refractive Indices of. E. J. Parry. (*Chem. and Drugg*, 1910, **76**, 178.) The refractive indices of nearly eighty different essential oils, of

their more frequent constituents, and commoner adulterants are enumerated.

Eucalyptus, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 29.) Four samples sold as *E. globulus* oil ranged in sp. gr. from 0·9205 to 0·922; a_D + 3°30′ to + 4°0′; cineol, from 56 to 63·2 per cent. One specimen of oil from an undescribed botanical source gave 84 per cent. of cineol. Oils of this nature vary in sp. gr. from 0·917 to 0·927; a_D − 2°0′ to + 1°0′; cineol, 74 to 84 per cent. These contain no phellandrene.

Fennel, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 30. An adulterated sample from a French source, which did not even show turbidity at − 5°C., had the following characters: Sp. gr. 0·893; a_D+ 20°; insoluble in alcohol 80 per cent. As a comparison a specimen from a current distillation gave sp. gr. 0·9845; a_D + 5°; solid at + 11°C.; solubility in alcohol 80 per cent., 1 : 8. Two other samples from foreign sources were insoluble in ten volumes of alcohol 80 per cent.

Fractional Distillation and Boiling Point Tests of Essential Oils. (*Schimmels' Report*, Oct., **1909,** 102.) The importance of giving precise indications of the methods to be followed in determining boiling points and the dimensions and form of the vessel used in fractional distillations is insisted on. This is specially necessary in the case of pharmacopœias and text-books published for the use of analysts and pharmacists. Cases are frequently arising in which erroneous results obtained by the use of unsuitable methods cause trouble between wholesale and retail dealers. Especially, stress should be laid on the fact that the mercury column of the thermometer should be entirely immersed in the vapour of the liquid being fractionated or the boiling point of which is being determined.

Geranium, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 31.) *French:* Six consignments ranged in sp. gr. from 0·8973 to 0·9017; a_D − 8°30′ to − 9°20′; geraniol 70 to 73 per cent.; geranyl tiglinate 22 to 26·5 per cent. *Indian:* Three of the higher grade oils, labelled "Turkish," had the sp. gr. 0·890 to 0·897; a_D + 0°18′ to + 2°30′; geraniol, 81 to 90 per cent.; geranyl tiglinate, 12 to 14·5 per cent. Five of the lower grade Indian oils, labelled "Indian," were found to have sp. gr. 0·922 to 0·937; a_D + 11°34′ to + 48°; geraniol, 40·6 to 45 per cent.; geranyl tiglinate, 8·2 to 8·9 per cent. These last oils are

inferior in odour, but the nature of the adulterant, if any, has not been detected.

Gurjun Balsam, Essential Oil of, Identification of. H. Philipp. (*Liebig's Annalen,* **369,** 41.) When gurjun balsam oil, purified by distillation *in vacuo*, is oxidized with $KMnO_4$, in acetone solution, a ketone or aldehyde is formed having the formula $C_{15}H_{24}O$; b.p. 170–180° under 12 mm. This forms a semi-carbazone, m.p. 234°C. This body may serve for the identification of gurjun oil as an adulterant of copaiba.

Hyacinth, Essential Oil of. Spaltcholz and Enklaar, (*Chem. Weekblad,* **1910,** 1; *Schimmels' Report,* April, **1910,** 71.) By extracting hyacinth flowers by brief contact with benzene, and distilling off the solvent under reduced pressure, then precipitating fatty matter with dilute alcohol and again concentrating the alcoholic filtrate, 0 016 per cent. of crude oil was obtained, with an unpleasant odour until largely diluted. H_2S was detected on washing the oil with dilute alkali. After removing fatty matter and resin by cooling the petroleum ether solution to − 20°C. and filtering and removing the solvent, the oil was fractionated under reduced pressure. The first fraction contained a very volatile substance with a disagreeable odour. In the second fraction an unknown oxygenated body was isolated. The third fraction contained benzyl benzoate and possibly free benzyl alcohol, and also a cinnamic ester; the benzoic acid liberated from alkaline solutions had the odour of vanillin. A fluorescent body, free from nitrogen, with a narcotic odour, was also isolated. This became red with acids, yellow with alkalies. No esters of anthranilic or methyl-anthranilic acids were detected. The wax present crystallizes from alcohol in colourless flakes, and persistently retains the odour of the flowers.

Inula helenium, Essential Oil of. (*Haensel's Report,* March, **1910.**) The essential oil of elecampane is solid at ordinary temperatures: sp. gr. 0 9830 at 22·5°C.

Juniper, Essential Oil of. (*Evans' Analyt. Notes,* **1909,** 37.) Seven foreign samples have been examined; all contain lower boiling constituents than are found in the oil distilled at Liverpool, and also a lower sp. gr. The sp. gr. varied from 0·8655 to 0·901; a_D − 2°50′ to − 9°46′; amount of distillate below 160°C. from 5 to 10 per cent.; residue above 200° from 15 to 50 per cent. The last figure was due to adulteration with non-

volatile fat. Oils distilled in Liverpool in November gave the following figures: Sp. gr. 0·872; α_D − 6°16′; distillate below 173°C., 0; residue at 200°C., 46 per cent.

Juniper, Essential Oil of. (*Southall's Report*, **1909,** 22.) The samples of "*Juniper Wood oil*" had the following characters: Sp. gr., 0 865 to 0·873 at 15·5°C.; α_D − 26·25° to − 27·79°; η_D 1·4736 to 1·4738; η_D of residue after distilling of 80 per cent., 1·4822 to 1·4863. Five samples of *Juniper berry oil* had the sp. gr. from 0·864 to 0 876; α_D − 3·68° to − 10·66°; η_D 1 4747 to 1·4795; η_D after distilling off 80 per cent., 1·4936 to 1·5004.

Juniper, Constituents of the Essential Oil of. (*Schimmels' Report*, Oct., **1909,** 71.) Besides pinene and cadinene, oil of juniper contains terpinenol, an alcohol which has been previously found in cardamom and marjoram oils; also another alcohol resembling geraniol or borneol in odour, which may be a mixture. The oil also contains small quantities of substances with a characteristic juniper odour.

Lantana camara, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, 1909, **4,** 127; *Schimmels' Report*, Oct., **1909,** 73.) This Verbenaceous plant grows in great profusion in the Philippines. The oil obtained from the leaves is pale yellow, with a pleasant sage-like odour; sp. gr., 0·9132, 30°/4°C.; $\alpha_{D\,30°}$ + 11·5.

Lemon Oil, Occurrence of Pinene in, as an Indication of Adulteration. — Chace (*Circular No.* 46, *U.S.A. Department of Agriculture*). J. C. Umney (*B. and C.D.*, **56,** **447**). E. J. Parry (*C. and D.*, 786, 875). H. W. Wiley (*Amer. Perf.*, 1910, **4,** 226). H. E. Burgess (*C. and D.*, 1909, **75,** **946**). The action of the Customs Board of New York of rejecting certain parcels of lemon oil, on account of the presence of small amounts of pinene, as shown by Chace's microscopical method for detecting Wallach's pinene nitrosochloride by the form of its crystals, has led to a wide controversy, as the above references indicate. Chace has pursued the matter further, has visited Sicily and examined on the spot 145 samples of pure oil. He found the following characters: Sp. gr. 0·8557 to 0·8594 at 15°C.; $\alpha_{D\,20°}$ + 55·7 to + 64·5°. One sample of Messina oil and one from Palermo were below this + 54·2° and 54·9° respectively; and one Syracuse oil was higher, 66 3°; η_D 1·4743 to 1·4758; citral, by the fuchsine-bisulphite method, 4·1 to 7 per cent.; difference

in a_D between original oil and the first 10 per cent. fraction 1·01 to 6·17°. No acicular crystals characteristic of limonene nitrosochloride were obtained from the first 10 per cent. fraction of any of these oils, whereas it was found in a large proportion of the oils shipped to New York during 1907, and therefore rejected there; consequently he adheres to his statement that all oils which give acicular nitrosochloride crystals should be regarded as adulterated. Umney considers that the presence of acicular crystals is not conclusive evidence of pinene, since other terpenes may give crystals of similar appearance. The determination of the melting point, 103°C., for pinene nitrosochloride, is the only reliable factor. Nor does he entirely accept the method employed for fractional distillation as reliable. Schimmels defend the latter; they admit that at first they considered pinene not to be a normal constituent of lemon oil, but have since found it to be present, as originally stated by Burgess, in minute quantity. They also state that the difference in the a_D between the original oil and the first 10 per cent. fraction may sometimes amount to 5°, and Chace himself has found it to amount to 6·17°. Parry has given from 7 to 8°, but this is considered to be too high. Parry differs from the conclusions of Chace. The results may be affected by other causes, such as the degree of maturity of the fruits and the season of the year and climatic conditions. These may so far influence the pinene content that, occasionally, genuine oils may give indications of pinene by the nitrosochloride crystals test. The oils declared by Chace to be adulterated showed identical figures for optical rotation with the authentic specimens he has examined. Whereas had turpentine been added in a proportion exceeding 2 per cent., the observed differences would have been greater. The mere observation of microscopical form is also attacked by Parry on the grounds that Wallach has stated that limonene nitrosochloride occurs in two isomeric crystalline forms, and as by Chace's method about 80 per cent. of one form and 20 per cent. of the other are produced, these different crystals might easily lead to erroneous conclusions. H. W. Wiley joins issue with Parry and defends the position of Chace. He also states that since the United States authorities have refused to admit lemon oil giving pinene nitrosochloride crystals, oil presenting that doubtful character has ceased to be offered. Burgess holds that the most reliable method of detecting added turpentine is fractional distillation under diminished pressure, with observation

of the a_D of the first fractions. Schimmels state that when only traces of pinene are found they do not consider them to be sufficient grounds for rejecting an oil of lemon.

Lemon Oil, Constituents of. E. Gildemeister and W. Müller. (*Chem. Zentralblat*, 1909, **2**, 2159.) The lowest boiling fractions of lemon oil which had been freed from oxygenated constituents by treatment with dilute alcohol, were found to contain small quantities of pinene and camphene. The presence of *l*-camphene was confirmed. Pinene was present in both the active and inactive forms, but was for the most part present as *l*-a-pinene, yielding optically active pinonic acid ($[a]_D$ = about $-65°$ in chloroform) on oxidation. The presence of β-phellandrene and β-pinene was also detected. In all fractions boiling at 173°C. or higher temperatures, γ-terpinene was detected, yielding an oxidation with alkaline permanganate, a characteristic erythritol (m.pt. 237°C.), which agreed in its properties with 1.2.4.5-tetrahydroxyhexahydrocymene. The sesquiterpene fraction of lemon oil was found to contain the bisabolene discovered by Tucholka in the essential oil of Bisabol myrrh, and probably also cadinene.

Lignaloe, Essential Oil of, Determination of Linalol in, by the Acetylation Method. P. Jeancard and C. Satie. (*Amer. Drugg.*, 1910, **56**, 41.) In a general criticism of the official methods of the U.S.P. 1900 for examining essential oils, the unsatisfactory results obtained with oils containing linalol when attempts are made to determine that alcohol by acetylation, is commented on. The following modification is stated to give satisfactory results. One part of the oil, one part of acetic anhydride and five parts of xylene are heated to boiling. The acetylation product is washed four times in succession with sodium carbonate solution. The requisite quantity of acetylized oil is then weighed off and its saponification equivalent determined in the usual manner. An example is given of (lignaloe) rosewood oils which, when acetylized in the ordinary way without dilution, give only 45 to 52 per cent. of linalol, when treated as above, give results equivalent to 70 to 91 per cent, of that alcohol. (See also *Y.B.*, **1905**, 106; **1906**, 47; **1907**, 96; **1908**, 105; **1909**, 49.)

Matricaria Chamomilla Flowers and Thalami, Essential Oil of. A. Jama. (*Apoth. Zeit.*, 1909, **24**, 585.) The essential oil of

chamomile flowers separated from the thalami is deep blue in colour; sp. gr., 0·954 at 15°C.; a_D + 0°; saponification value, 74·7; yield, 0·35 per cent. The oil from the capitula freed from flowers is at first pale green in colour, then yellowish-brown; sp. gr., 0·949 at 15°C.; a_D + 0°; saponification value, 33·7; yield, 0·51 per cent. The flower oil remains deep blue when exposed to the light in a thin layer for several weeks, and only shows a brownish colour round the edge after a month's exposure. Oil from the thalami soon becomes yellowish under these conditions, and in four weeks is quite brown. Illustrations of sections of the thalamus, showing the distribution of oil therein, and of the oil-bearing hair-like glands of the flowers, are given.

Monodora grandiflora Seeds, Essential Oil of. R. Leimbach. (*Schimmels' Report*, April, **1910,** 77.) The tree is a native of Africa. Its seeds yield 30 per cent. (?) of essential oil having the following characters: sp. gr. 0·8574 at 15°C.; a_D – 46°15′; acid value, 3·9; saponification value, 7 to 12; solubility in alcohol 90 per cent., 1 : 3·5. The oil is pale yellow, with an odour of cymene. It contains phellandrene and possibly camphene. Para-cymene was also found. The higher boiling fractions yielded palmitic acid and probably a little cavacrol, but the major portion consists of a compound with the generic formula, $C_{10}H_{16}O$, b.p. 130 to 154°C. under 30 mm. Sp. gr. 0·9351 at 15°C.; a_D – 9°14′, to which the aromatic odour of the oil is partly due. A sesquiterpene, b.p. 260–270°; sp. gr. 0·9138 at 15°C.; a_D + 24°, not yet identified, and a solid substance, m.p. 160–163°C., were also isolated.

Morinda citrifolia, Essential Oil of. P. van Romburgh. (*Konink. acad. Weten. Amsterdam*, **1909,** 17; *Schimmels' Report*, Oct., **1909,** 80.) The oil distilled in Java from the fruit of *Morinda citrifolia* has the sp. gr. 0·927 at 13°C. and deposits crystalline paraffins at that temperature. It contains capronic and caprylic acids as well as traces of higher aliphatic acids, over 90 per cent. of the oil consisting of volatile acids. The neutral portion of the oil contained ethyl alcohol, and possibly methyl alcohol.

Neroli and Petitgrain, Algerian Oils. A. Chapus. (*J. Pharm. Chim.*, 1909, **30,** 484.) In view of the presence on the market of neroli and petit grain oils produced in Algeria, the following results obtained with Algerian oils are of interest:—

Essential Oil.	Sp. gr. at 15°C.	Optical Rotation in 100 mm tube at 15°C.	Esters.	Source.
Neroli bigarade . .	0·8768	+ 5° 57′	31·99	Blida
" " . .	0·8739	+ 6° 6′	25·26	Boufarik.
" " . .	0·8723	+ 5° 42′	28·38	Blida, Bouquet de Nice.
Neroli portugal . .	0·8731	+26° 15′	34·18	Blida.
Petitgrain bigarade .	0·8755	− 5° 5′	42 39	Blida.
Petitgrain portugal .	0·8705	+21° 33′	21·62	Blida.

Compared with French oils, these Algerian *Neroli bigarade* oils have a higher ester content, but about the same sp. gr. and optical rotation. The Algerian *Neroli portugal* oil has a higher sp. gr. and optical rotation than Spanish oils of this variety.

Nutmeg, Essential Oil of. (*Schimmels' Report*, April, **1910,** 80.) Further investigation of oil of nutmeg shows that the hydrocarbon fractions contain β-pinene and para-cymene, besides α-pinene camphene and dipentene. The chief constituent of the hitherto unidentified alcohols is dextro-terpineol-4. (See also *Y.B.*, **1908,** 124.)

Ocimum basilicum, Javan, Essential Oil of. P. van Romburgh. (*Konink. Akad. v. Wetenschap. Amsterdam ; Schimmels' Report*, Oct., **1909,** 26.) A considerable quantity of the oil having been distilled at Buitenzorg, the investigation originally reported on (*Y.B.*, **1901,** 93) is being continued. The presence of methylchavicol is confirmed, and cineol has also been isolated from the oil.

Ononis spinosa, Essential Oil of. (*Haensel's Report*, March, 1910.) The air-dried root of the spiny rest-harrow yields only 0·006 per cent. of fluid essential oil, but the distillation water gives 0 0132 of further yield, which is solid at ordinary temperatures. The liquid oil is acid in reaction ; sp. gr. 0·9917 at 15°C., and contains but little terpene.

Orange, West Indian, Essential Oil of. (*Evans' Analyt. Report*' **1909,** 42.) Two small consignments of West Indian orange oils have been examined. The bitter variety had the sp. gr. 0·852 ; α_D + 97°30′. Sweet West Indian orange oil gave sp. gr. 0·8486 ; αD + 99°0′.

Parsley Fruits, Essential Oil of. (*Evans' Analyt. Notes*,

1909, 43.) Two distillates had the sp. gr. 1·053 to 1·054; a_D − 8°56′ to − 8°15.′ Soluble 1 : 5 of alcohol 80 per cent.

Patchouli Leaves, Production of Essential Oil of. de Jong. (*Teysmannia*, 1909; *Schimmels' Report*, Oct., **1909, 93.**) Fresh Javan patchouli leaves yield only a small quantity of oil, and the greater part of this is obtained in a second distillation, after drying. Fermented and dried leaves yielded nearly three times as much oil. (See also *Y.B.*, **1909, 65**).

Pennyroyal, Essential Oil of. (*Evans' Analyt. Notes*, **1909, 45.**) Ten samples from English and French sources have been examined. The English oils range in sp. gr. from 0·927 to 0·949; a_D from + 29°0′ to + 30°0′. The French oil had the sp. gr. 0·932 to 0·948 and the a_D + 15°0′ to + 19°0′.

Peppermint Oil, French. (*Roure-Bertrand fils' Report*, **1909,** 40; *Schimmels' Report*, Oct., **1909, 98.**) The following constituents have been isolated from French peppermint oil: isovaleric aldehyde; iso-amyl alcohol; laevo-pinene; Δ^3*p*-menthene; cineol; these amount to about 6 per cent. of the oil. Besides these there was present 6·4 per cent. of menthone, 38 per cent. of free methol and 13·5 per cent. combined as esters.

Peppermint, Japanese, Limonene in Essential Oil of. Y. Murayama. (*Yakugakuzasshi*, 1910, **307,** 141; *J. Pharm. Chim.*, 1910, **1,** 549.) Laevo-limonene is a constituent of the terpenes of Japanese peppermint oil. Phellandrene was not definitely detected.

Peppermint, Syrian, Essential Oil of. (*Haensel's Report*, March, 1910.) This peppermint oil is of good odour: sp. gr. 0·913 at 15°C.; acid value, 0; ester value, 22·25; acetyl value, 151·5.

Petitgrain Oil, Adulterated. E. J. Parry. (*C. & D.*, 1909, **75, 410.**) Two specimens of the oil having an abnormally high sp. gr. 0·902 and 0·908 at 15°C. were found to contain a foreign artificial ester, probably ethyl tartrate. Two other samples of high sp. gr. showed extremely excessive acid values, due, probably, to the admixture of about 15 per cent. of oleic acid.

Picea engelmanni, P. murrayana, and P. edulis, Essential Oils of. J. Swenholt. (*Mid. Drugg.*, 1909, **43,** 611.) The needles and small branches of Engelmann's spruce gave a camphoraceous oil with the following characters: Sp. gr. 0·895 at

15°C.; a_D + 1°55′ in a 5 cm. tube; saponification value, 24·15. *Pinus murrayana*, the lodge pole pine, gave oil with the saponification value 51·87. *Pinus edulis* oil had a pleasant aroma; sp. gr. 0·8653 at 15°C.; a_D − 3°36′ in a 5 cm. tube; saponification value, 17·55.

Pimenta acris Fruits, Essential Oil of. (*Bull. Imp. Inst.*, 1910, **8**, 4.) A parcel of the fruits from Mauritius yielded 3·3 per cent. of essential oil, having the following characters: Sp. gr. 0·9893 at 15°C.; a_D − 1°20′; solubility 1 : 0-8 and more of alcohol, 80 per cent.; eugenol, 70 per cent. The odour of the oil closely resembles that of the oil distilled in the West Indies from the leaves, and largely used as a perfume for toilet preparations, under the name of "West Indian Bay" oil or "Oil of Myrcia acris." The fruits are small, hard, somewhat pear-shaped, rough, aromatic berries. The fruit oil does not appear to have been distilled before.

Pinus halapensis, Algerian, Essential Oil of. — Vezes. (*Bull. Soc. Chim.*, 1909, **5**, 931.) The carefully collected resin yielded 27 per cent. of essential oil; cruder and dirtier resin gave 14 to 17 per cent. The oil has the sp. gr. 0·855 to 0·8568 at 25°C.; a_D + 46·6 to + 47·6°. The oil probably contains dextro-pinene to the extent of 80 per cent.

Pittosporum resiniferum and P. pendantrum, Oil of. R. F. Bacon. (*Philippine J. Sci.*, 1909, **4**, 93.) The fruits of *Pittosporum resiniferum* are known, on account of their odour, as petroleum nuts. They yield to pressure 0·68 per cent. of viscous oil, quickly resinifying in the air. A portion distilled below 165°C, when decomposition occurred. Heptane and a dihydroterpene have been isolated as constituents.

The fruits of *P. undulatum* yielded a small quantity of oil to steam distillation. It consisted mainly of the above dihydroterpene and contained no heptane. (See also *Y.B.*, **1907**, 129.)

Rhus cotinus, Essential Oil of. G. Perrier and A. Fouchet. (*Bull. Sci. pharm.*, **16**, 589.) The leaves and young shoots of *Rhus cotinus* yield to steam distillation 0·1 per cent. of colourless oil, with a turpentine odour. Sp. gr. 0·875 at 15°C.; η_D 1,4693; a_D + 13°6′; acid value, 6·1; saponification value, 34·3. The oil hardens very quickly on exposure to air. It contains free primary alcohols and aldehydes.

Rose, Essential Oil of, 1909. (J. C. Umney.) (*Chem. & Drugg.*, 1909, **75,** 786.) For the comparison of odour of samples of otto, both delicacy and permanent sweetness have to be taken into account. In determining this characteristic the odour was tried when freshly exposed on blotting-paper, then after one hour, and again after 24 hours. The conclusions arrived at are set out in the following table in the order as selected. The author's observations were checked by two experts, one English and one French, and their opinions coincided with his, with the exception of some doubt in "placing" samples Nos. 2 and 3.

CHARACTERS OF OTTO OF ROSE, 1909

Sample.	Sp Gr at $\frac{30°}{15°}$ C	Ref Index at 25° C	Melting-point	Percentage of Alcohols calculated to $C_{10}H_{18}O$	Odour Value
1	0·861	1·4622	21°–22°	76·1	Very soft and lasting.
2	0·860	1·4635	21°–22°	73·3	Very sweet.
3	0·858	1·4630	21°	74·1	Very sweet.
4	0·860	1·4620	21°–22°	73·7	Fine.
5	0·856	1·4620	21°–22°	72·5	Not very lasting.
6	0·860	1·4640	21°–22°	75·1	Fair.
7	0·857	1·4612	21°	75·5	Strong and coarse.
8	0·860	1·4630	21° 22°	78·2	Impure.
9	0·862	1·4640	21°	78·4	

E. J. Parry has stated that in his opinion a pure otto of rose rarely exceeds 75 in alcoholic percentage, and this figure agrees with the experience of Schimmels (*Y.B.*, **1908,** 170). There is, however, one important feature. Otto of rose has apparently risen considerably in percentage of alcohols since November, 1896 (*Y.B.*, **1897,** 189), when the author reported on fine and, in his opinion, pure samples of otto of rose, the characters of which were as under :—

CHARACTERS OF OTTO OF ROSE, 1896

Sample.	Sp Gr at $\frac{30°}{15°}$ C.	Crystallizing Point	Percentage of Alcohols calculated to $C_{10}H_{18}O$.
1 . . .	0·8566	20·9° C.	70·1
2 . . .	0·8599	20·4° C.	72·3
3 . . .	0·861	20·4° C.	73·1
4 . . .	0·859	20·6° C.	72·3
5 . . .	0·856	21·7° C.	69·2

What has happened since ? Is the rise in percentage of alcohols of apparently the finest otto of rose due to (1) difference in season, (2) difference in the method of distillation, or (3) the employment of more subtle adulterants than of twelve years ago ?

In reviewing these figures, it is concluded :—

(1) That the adulteration of otto of rose is to-day generally of a much more skilful nature than it was ten years ago.

(2) That any otto of rose which shows physical and chemical characters *much* outside fairly well-defined limits may be at once condemned as impure.

(3) That perfectly pure samples may have characters very slightly outside the average limits of the season's otto, but so long as the odour of such otto is of the best it should not be condemned.

(4) That the physical and chemical characters *alone* do not guarantee the purity of a given sample. The most skilful adulteration aims at producing mixtures having the same general characters as otto of rose, and the odour value of a sample must be taken into account in judging an otto. If a sample has all the usual physical and chemical characters of a normal pure otto, yet its odour, in the opinion of an expert, is not that of a typical pure otto, it should unhesitatingly be condemned.

Rose, Essential Oil of, Adulterated. E. J. Parry. (*Chem. and Drugg.*, 1909, **75,** 292.) The determination of the amount of alcohols present in the oil, calculated as geraniol, is the most useful test to supplement the physical characters. Genuine otto of rose rarely contains as much as 75 per cent. of alcohols, calculated as geraniol, and any figure above this must be regarded with suspicion. Five samples of otto of this season's distillation, all of which were sold as "guaranteed pure," have been all found to be adulterated, giving the following figures on analysis :—

	1	2	3	4	5
Sp. gr. at 30°	0·362	0·860	0·861	0·864	0·8595
Refractive index at 25°	1·4649	1·4660	1·4652	1·4670	1·4642
Optical rotation. . .	−2°	−2°30′	−2°30′	−2°45′	−2°20′
Ester value	9	11	8	7·5	8·8
Total alcohols . . .	79·5%	79%	81%	82%	80%

Rue, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 47.) Four

samples of rue oil of low quality have been met with; two were French, one American, and the fourth of unknown origin. The sp. gr. of the French oils was 0·841; a_D 1°30′ and 1°50′; solidifying at + 0·5° and 0·75°C. The American oil had the sp. gr. 0·855; a_D − 10°0′; solidified at − 5·5°C. The other oil did not solidify at − 8°C.; sp. gr. 0·851; a_D − 10°10′.

Sambucus ebulus Leaves, Essential Oil of. (*Haensel's Report*, March, **1910**.) The leaves of the dwarf elder yield 0·076 per cent. of a dark brown, unpleasant smelling essential oil: sp. gr. 0·8998; acid value, 250·9; ester value, 46. After saponification the odour of the oil becomes pleasant and fruity, resembling that of dried peaches or apricots. It contains palmitic acid.

Sandalwood, East Indian, Characters of Essential Oil of. (*Evans' Analyt. Notes*, **1909**, 48.) The characters of the oil distilled during the year fell between the following limits: Sp. gr. 0·974 to 0·979 at 15·5°C.; a_D − 15°40′ to − 19°; esters as santalyl acetate, 3·3 to 4·6 per cent.; total santalol, 92·44 to 94·07 per cent.

Sandalwood, East Indian, Characters of, Essential Oil of. (*Southall's Report*, **1909**, 25.) The samples examined ranged in characters as follows: Sp. gr. 0·974 to 0·980 at 15·5°C.; a_D − 16·25° to − 18·6°; santalol, 90·89 to 98·57 per cent.

Sandalwood, East Indian, Essential Oil of. Stafford Allen & Son. (*Chem. and Drugg.*, 1910, **76**, 293.) A table is given showing the characters of the oils distilled from Mysore sandalwood during a period of two years and nine months. Of the 170 samples thus enumerated the following are the highest and lowest limits of the physical constants thus recorded. Sp. gr. 0·9733 to 0·9799 at 15°C.; solubility in alcohol 70 per cent. at 15°C., 1 : 4 to 1 : 14; a_D − 13·32 to − 20·6°.

Sandalwood, East Indian, Essential Oil of, Commercial Samples of. B. O. Leubner. (*Merck's Report*; *Pharm. J.*, 1910, **30**, 639.) The following ten samples of oil are representative of the E.I. sandalwood oil at present met with in American commerce:—

Samples tested.	Santalol, per cent.	Santalol Esters, per cent.	Acid Number.	Optical Rotation.	Specific Gravity at 25°C.	Solubility in 70% Alcohol.
1	97·3	1·92	3·29	−18°	0·972	1 in 4
2	90·1	1·91	2·59	− 9°	0·956	1 in 7
3	97	1·60	1·64	−19°	0·968	1 in 4
4	96·5	3·34	1·41	−18°	0·965	1 in 4
5	98	1·53	1·07	−13°	0·951	Insoluble
6	93·7	1·45	4·28	−17°	0·973	1 in 5
7	94·3	3·07	5·48	−11°	0·972	Insoluble
8	95	3·25	1·75	−16°	0·971	1 in 5
9	99·6	2·74	4·28	−19°	0·974	1 in 4
10	98	2·40	2·44	−13·3	0·973	Insoluble

It is noteworthy that all the samples which were soluble in 1 to 5 parts of 70 per cent. alcohol had the required sp. gr., while several of those not soluble in 1 to 5 parts had a sp. gr. lower than the U.S.P. standard.

The same can be said of the optical activity. The oils which did not conform to the solubility test had a very low rotation.

Spearmint, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 52.) English spearmint oil was found to have the sp. gr. 0·958 ; α_D − 44°0′. French oil had the sp. gr. 0·928 ; α_D − 47°0′.

Star Anise, New Constituents in Essential Oil of. (*Schimmels' Report*, April, **1910, 99.**) Para-cymene, cineol, safrol, and terpineol have been found in Chinese star anise oil, in addition to the previously recorded constituents. The phellandrene present is shown to be a mixture of α- and β-phellandrene.

Styrol, Polymerization of, by Light and Heat. H. Stobbe and G. Posjuah. (*Liebig's Annalen*, 1910, **371,** 259.) Exposure to light and heat causes the polymerization of styrol into meta-styrol $(C_8H_8)_n$. When pure, this is a white, odourless, light powder. Simon first noticed that when styrol is thus exposed it was converted into a jelly-like substance ; this he erroneously attributed to oxidation. The jelly-like mass is a mixture of styrol and meta-styrol.

Terpinolene, a New Adulterant of Essential Oils. J. C. Umney (*Chem. and Drugg.*, **1909, 75,** 292.) Terpinolene is a by-product of the manufacture of terpineol. Being cheap and possessing the suitable characters, it has been used to adulterate certain essential oils, such as spike lavender. It may be detected by its odour. At first when smelt on blotting paper

this is pungent and camphoraceous. After being exposed thus for four hours a lilac-like odour is evident. Terpinolene is optically inactive; b.p. 185 to 190°C. Commercial samples vary somewhat in composition. Its characteristic odour is very evident in the fractions, b.p. 185–195°C., of those oils which contain it.

Thyme, Essential Oil of. (*Evans' Analyt. Report*, **1909,** 56.) Genuine French red thyme oils have yielded from 29 to 37 per cent. of phenols. One adulterated sample contained only 3 per cent., and had the low sp. gr. of 0·876.

Turmeric, Essential Oil of. H. R u p e, E. L u k s c h, and A. Steinbach. (*Berichte*, 1909, **42,** 2515.) The oil examined had the sp. gr. 0·9388 at 20°C.; a_D = − 24·76° at 20°C. The fraction distilling under 10 mm. between 80° and 117°C., was found to contain *n*- (*a*)-phellandrene. The principal fraction boiled between 146° and 160°C. under 10 mm. On further fractionation this portion boiled at 155° to 158°C. 11 mm., and was found to be identical with the turmerol of Jackson and Menke (*Y.B.*, **1883,** 155). It yielded no crystalline derivatives. When turmeric oil is boiled with alcoholic KOH, a ketone, *curcumone*, $C_{13}H_{18}O$, is formed, b.p. 122°C. at 11 mm.; sp. gr. 0·9566 at 20°C.; a_D = + 80·55° at 20°C. Its semicarbazone melts at 120°–121°C. It condenses with benzaldehyde to form benzylidene-curcumone, $C_{13}H_{16}O : CH{\cdot}C_6H_5$, m.p. 106°C.

Vitex agnus castus Fruit, Essential Oil of. (*Haensel's Report*, March, **1910.**) The yield is 0 47 per cent. of pale yellow spicy oil with an unpleasant fishy odour; sp. gr. 0·896; acid value, 7·41; ester value, 24; acetyl value, 40. After saponification the oil has a piperaceous odour; and after acetylizing it loses the fishy smell; the last is probably due to a strong empyreumatic phenol.

Wintergreen, Essential Oil of. (*Evans' Analyt. Notes*, **1909,** 58.) The precise botanical source of commercial "wintergreen" oils is uncertain; probably in some cases these oils are mixtures. A specimen offered as the unmixed distillate from the bark of *Betula lenta* gave the following figures: Sp. gr. 1·188, optically inactive; methyl salicylate, 99·8 per cent. Artificial oil of wintergreen may be distinguished by the slight aniline-like odour of the alkaline liquid after saponification. With oils said to be obtained from *Gaultheria procumbens*, the odour is

rubber-like. The above *Betula lenta* oil gave a faint not unpleasant odour in the saponification liquid.

Yellow Pine Oil, New Constituents of. (*Schimmels' Report*, April, **1910,** 103.) In addition to the α-terpineol previously recorded by Teeple as a constituent of this oil, α- and β-pinene, camphene, laevo-limonene, dipentene, cineol, fenchyl alcohol, camphor, borneol, and methyl-chavicol have been isolated. Cineol, methyl-chavicol, camphor, and fenchyl alcohol have not previously been found in a pine oil.

Zedoary Root, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, **1909,** 132; *Schimmels' Report*, Oct., **1909,** 131.) *Curcuma zedoaria* grows abundantly in the neighbourhood of Manila. The yield of oil from the roots, distilled locally, was 0·065 per cent., besides a crystalline solid substance. The oil was deep bluish-green; sp. gr. 30°/4°C., 0·933; η_D 30° 1,4920; α_D not more than + 1·5; odour camphoraceous, due to the lower boiling constituents, possibly cineol.

FATS, FIXED OILS AND WAXES

Beeswax, Detection of Tallow in. A. Ostrogovich and S. Petrisor. (*Chem. Zentralblatt*, 1909, **2,** 1170.) From 6 to 7 Gm. of $ZnCl_2$ is melted in a porcelain crucible, and 1 Gm. of the wax is added thereto. The crucible is covered with a lid, the under side of which has been wetted with 2–3 drops of a solution of 0·3 Gm. of phloroglucinol in 100 c.c. of strong H_2SO_4. The covered crucible is heated for 35–40 seconds, and then the underside of the lid examined. If the sample of wax contain tallow, the acrolein formed will have developed with the phloroglucinol reagent a reddish-violet colour, which is intensified on addition of a few drops of EtOH. With pure wax, only a faint brown colouration is produced.

Beeswax, French Codex Test for Foreign Fats, Resins, and Waxes in. P. Le Naour. (*Ann. Chim. analyt.*, 1909, **14,** 369.) The official test of the French Codex, **1908,** specifies that when 1 Gm. of beeswax is boiled for 30 minutes with 35 c.c. of *aqueous* 15 per cent. NaOH solution, the amount of water lost by evaporation being replaced by the addition of hot water, the liquid, cooled and strained through absorbent cotton, should not give a precipitate when acidified with HCl. This result is taken to

indicate freedom from admixture with foreign fats, waxes, and resins. The test is found to be defective. No precipitate is obtained, under the conditions indicated, even when fragments of a stearine candle are thus treated, nor if 20 per cent. *aqueous* KOH be substituted for the NaOH solution for saponifying. But if saturated solution of Na_2CO_3 be used in place of the NaOH, sodium stearate is formed, solidifying on cooling, but re-dissolving on warming; on acidifying with HCl stearic acid is liberated.

Camellia japonica and C. sasanqua, Fixed Oil of the Seeds of. M. Tsujimoto. (*Pharm. Zentralh.*, 1910, **51**, 255.) The fixed oil of *Camellia* (*Thea*) *japonica*, known in Japan as "Tsubaki oil" is used as a culinary oil and for cosmetic purposes. As it is non-drying, it would be useful as a lubricant for delicate machinery. Sp. gr., 0·9159 to 0·9166; acid value, 1·63 to 8·84; saponification value, 189·89 to 192·58; Wijs value, 80·07 to 81·28; η_D, 1·4679 to 1,4691; Hehner value, 95·3 to 95·6; Reichert Meissl value, 0·48 to 0 53.

Oil of *Camellia* (*Thea*) *sasanqua* is closely allied to the above. Sp. gr., 0·9163 to 0·9181; acid value, 0·36 to 6·78; saponification value, 193·36 to 193·9; Wijs value, 81·67 to 82·31; η_D, 1·4691; Hehner value, 96·35.; Reichert Meissl value, 1·17.

Candelilla Wax, Mexican. (*Bull. Imp. Inst.*, 1910, **7**, 410.) "Candelilla wax," which occurs as an excretion covering all parts, except the roots, of *Euphorbia antisyphilitica*, has the following characters:—M.p., 77·4°C.; sp. gr. at 15°C., 0·9473; saponification value, 104·11; iodine value, 5·23; acid value, 0·03. The wax should be suitable as a substitute for carnauba wax.

Carnauba Wax and Similar Resistant Waxes, Saponification of. R. Berg. (*Chem. Zeit.*, 1909, **33**, 885.) In determining the saponification value of carnauba and other waxes which are markedly resistant to saponification, all the methods which have been suggested to accelerate and complete the saponification introduce errors into the test. This difficulty is overcome by using xylene as the solvent medium. To 4 Gm. of wax dissolved in 20 c.c. of xylene, 50 cc. of N/2 KOH are added, the acid value being determined in the usual way during the addition of the alkali. The flask is heated under a reflux con-

denser for two hours on a vigorously boiling water-bath, when complete saponification will be effected. The soap separates in part, and is dissolved in 100 c.c. or more of alcohol added until a clear solution is obtained, when titration is proceeded with in the usual way. In the exceptional case of saponification not being complete after heating on the water-bath, a few minutes' boiling over a flame, with or without the further addition of xylene, is sufficient to complete the reaction.

Coconut Fat, Crude, Methyl-heptyl-ketone and Methyl-nonyl-ketone in. A. Haller and A. Lassieur. (*Comptes rend.*, 1910, **150,** 1013.) Crude coconut fat owes its peculiar odour mainly to the presence of methyl-heptyl-ketone and methyl-nonyl-ketone, which are the chief constituents, also, of rue oil. (*Y.B.*, **1901,** 108; **1902,** 134; **1903,** 150; **1907,** 142.) A minute trace of a laevo-rotatory aldehyde is also present. Even the purified coconut fat employed for dietetic purposes retains sufficient traces of these ketones to render their peculiar odour detectable when the fat is melted.

Cod-Liver Oil, Norwegian, Characters of. (*Southall's Report*, **1909,** 10.) Authentic Norwegian cod-liver oil gave the following characters for the seasons of 1908 and 1909 respectively: Sp. gr., 0·928 and 0·9275; saponification value, 189·7 and 188·1; iodine value, 155·2 and 153·7; free acid, as oleic acid, 0·28 and 0·43 per cent.; unsaponifiable matter, 1·47 and 1·46 per cent.; $\eta_{D\ 15 \cdot 5^\circ}$ 1,4802 and 1,4805. Colour reactions normal. A sample offered as genuine Norwegian oil had the iodine value 163·4; free acid as oleic acid, 6·57 per cent.; unsaponifiable matter, 1·13 per cent.; $\eta_{D\ 15 \cdot 5^\circ}$ 1,4814; and failed to give a purple colour with H_2SO_4.

Fixed Oils, Transvaal Castor, Arachis, Linseed and Sunflower. E. M. Holmes. (*Pharm. J.*, 1910, **30,** 50.) Museum specimens examined by J. C. Umney and C. J. Bennett were thus reported on:—

"The oils were turbid and dirty when received, but were allowed to clarify by settling. The castor oil was dark in colour, and would require bleaching unless used for cattle or for industrial purposes. They afforded the following constants:—

	Specific Gravity.	Saponification Number.	Iodine Number.	Refractive Index.
Castor Oil	0·964	182·8	85·7	1·4812
Ground Nut . . .	0·921	189·6	88·2	1·4722
Linseed	0·933	192·3	173·8	1·4835
Sunflower	0·932	187·5	114·2	1·4780

These figures come within the limits of typical oils, but the iodine number of sunflower oil is rather less than the lowest figure, 119·7, given by Lewkowitsch.

Horse Chestnut Seeds, Fixed Oil of. Morten-Stillesen. (*J. Pharm. Chim.*, 1909, **30**, 112.) Horse chestnuts yield to benzol 1·5 to 3 per cent. of a fatty oil with the following characters :—Sp. gr., 0·926 at 15°C. ; η_D 1,4747 ; saponification value, 194·5 ; iodine value, 95·4 ; Reichert-Meissl value, 1·54 ; Hehner value, 92·9 ; acetyl value, 13·5. The chief constituent is olein. It resembles almond oil, or fixed oil of mustard, in characters. The seeds also contain a minute trace of an essential oil, apparently resembling volatile oil of mustard.

Lard Substitute, Characters of. (*Evans' Analyt. Notes*, **1909, 39.**) A commercial specimen of lard substitute stated to be free from animal fat, had the following characters : M.p., 42°C. ; iodine value, 96·39 ; saponification value, 224 ; Butyro-refractive value at 45°C. = – 10·5. It gave marked reactions for cottonseed oil.

Mimusops djave Seeds, Constituents of. E. Fickendey. (*Tropenpflanzer*, **16** ; *Chem. Zentralblatt*, 1910, **1**, 1034.) The fresh seeds are white, odourless and yield 64·3 per cent. of edible fat, of the consistence of lard at ordinary temperatures. It is known as "adjab butter" and resembles shea butter in its properties. Sp. gr. 0·9172 ; acid value, 18·2 ; saponification value, 188·6 ; iodine value, 57·2 ; Reichert Meissl value, 0·8 ; Hehner value, 94·2. According to Krause the seeds contain a considerable amount of a poisonous saponin ; 2 or 3 Gm. of seed kernels will kill a hen in 6 to 18 hours.

Myrica Wax, Mexican. (*Bull. Imp. Inst.*, 1910, **7**, 410.) The fruits of *Myrica jalapensis*, a tree common in Vera Cruz, are covered with a greenish-white layer of wax. This has the

following characters: M.p., 43·2°C.; sp. gr. at 99°C., 0 8763; saponification value, 214·5; iodine value, 2·38; acid value, 4·07.

Ocatilla Wax of Fouquiera spendens. F. Ephraim. (*Pharm. Zeit.*, 1910, **55,** 47.) The greenish-white ocatilla wax which is found on the bark of *Fouquiera splendens* has had a limited application in therapeutics. When exposed to the sun, or to a current of warm air, this wax becomes converted into a hard, green, elastic mass, which is soluble in alcohol, alkalies and other solvents.

Oils, Animal, Indian. D. Hooper. (*Ann. Rept. Indian Museum, Industrial Section,* **1908–9,** 16.) (1) *Gangetic dolphin (Platanista gangetica) oil*—Susu or Sehu—used locally as an embrocation and illuminant, has the following characters: Sp. gr., 0·921, 15°C.; acid value, 21·36; saponification value, 198 8; iodine value, 106 9; Reichert-Meissl value, 0·71; fatty acids, 94 0 per cent.; titre value, 25·5°C.; acid value, 205; iodine value, 116·5. The solid fats consist chiefly of palmitin; no spermaceti is present.

(2) *Fish liver-oils.*—(1) White sting ray (*Trigon microps*); (2) Saw-fish (*Cristis perottetii*); (3) Spotted shark (*Stegostoma tigrinum*); (4) *Rhamphobatis ancylostomus.* The oils have the following characters:—

	Trigon Oil.	Cristis Oil.	Stegostoma Oil.	Rhamphobatis Oil.
Sp. gr. at 40° C.	0·914	0·900	0·910	0·909
M. pt.	22°C.	27°C.	26·5°C.	25·5°C.
Acid value	0·98	1·0	1·16	1·13
Saponification value	194·0	187·1	185·4	187·4
Iodine value	124·7	92·9	123·2	118·5
Reichert-Meissl value	0·26	0·28	0·21	0·23
Fatty acids, per cent.	93·2	94·7	94·2	94·6
Titre value	37·5°C.	39°C.	39°C.	39°C.
Acid value of fatty acids	203·4	192·2	189·9	190·4

Oils, Fixed, Detection of CS_2 extracted, in Expressed Oils.— Cusson. (*Annal, des Falsificat.*, **1909,** 409.) About 200 Gm. of the oil is weighed into a flask with 50 Gm. of EtOH 90 per cent.; after vigorously shaking the mixture, the flask is attached to a condenser, and distillation conducted gently on the

water-bath, and about one-third of the alcohol is distilled into a small receiver immersed in cold water and containing a few c.c. of alcoholic KOH. The distillate is made slightly acid with acetic acid, and a few drops of alcoholic solution of copper acetate are added. If CS_2 is present a yellow colouration or precipitate of copper xanthate is formed. Pure expressed oil gives no such colour.

Oils, Vegetable, of the B.P. C. E. Sage. (*Pharm. J.*, 1909, **29**, 760.) The official oils are dealt with at length, both historically and chemically.

Olive Oil, Detection of Arachis Oil in. P. Bohrisch. (*Pharm. Zentralh.*, 1910, **51**, 427.) Ten c.c. of the oil is saponified with 125 c.c. of N/2 alcoholic KOH, and the solution allowed to stand at the ordinary temperature for 4 or 5 hours. If the liquid remains perfectly clear, more than 10 per cent. of arachis oil or more than 20 per cent, of cottonseed or sesame oil is not present. If the liquid is turbid, the presence of foreign oils may be suspected. The turbid liquid is then warmed on the water-bath, and almost completely neutralized with concentrated HCl, stood in water at 15°C. for 10 minutes, and filtered through a 10 cm. filter. If the amount of arachis oil exceeds 15 to 20 per cent., or that of cotton seed oil more than 40 to 50 per cent., a fine white precipitate will be left on the filter. If the filter is one-third filled with a crystalline deposit, the oil is one or other of these. Ten or 20 c.c. of the filtrate is then stood, in a test glass, in water at 9–10°C. If no turbidity or precipitate appear, the oil is free from arachis oil and does not contain more than 10 per cent. of cottonseed oil. If a precipitate or turbidity is formed, the rest of the filtrate is kept over ice all night, and the resulting deposit is collected and dissolved in 90 per cent. alcohol by warming in the water-bath for a few minutes. If on then standing at the ordinary temperature for 1 hour no precipitate is reformed, arachis oil is absent.

Olive Oil, Tunisian, Reactions of simulating those of Sesame Oil. R. Marcille (*Annal. des Falsific.*, 1909, **2**, 224); and H. Imbert and L. Durand (*ibid.* 317). Olive oils obtained from Northern Tunis frequently yield a reaction with the Villiavecchia and Fabris test (HCl and furfural), which may lead to the conclusion that the oil is adulterated with sesame oil; oils from the Sousse and Sfax regions also yield a similar,

but less marked, reaction, but in no case do the oils give a positive reaction in Bellier's test, a mixture of HNO_3, sp. gr. 1 4, with a solution of resorcinol in C_6H_6. This test is, consequently, recommended for those olive oils which, from the results of other tests, may be suspected of containing sesame oil. The constituent in Algerian olive oil which gives the reaction with HCl and furfural is removed by washing the oil with hot water containing a little $NaHCO_3$, and washing with hot water alone eliminates the greater part of the substance. The treatment with $NaHCO_3$ does not affect oils which are adulterated with sesame oil.

Ostrich Fat, Characters of. J. Vamvakas. (*Annales Chim. Analyt.*, 1910, **15**, 64.) The natives of Barbary prepare a fat from the ostrich, which they regard as a valuable remedy for rheumatism. Crushed ostrich bones and pieces of fat are boiled with water, and the floating grease removed from the surface after cooling. The fat thus obtained separates on standing, at a temperature of about 28°C., into two distinct layers, the upper one liquid, the lower one solid. The liquid portion had the sp. gr. 0 9255 ; critical temperature of solution in alcohol, 70°C. ; Maumené index, 48°C. ; m.p., 8°C. ; solidifying point, 2°C. ; titre number, 49°C. ; solidifying point of fatty acids, 35·5°C. ; $\eta_D + 23$; Reichert-Meissl value, 7·6 ; Koettstorfer value, 211 ; Hehner value, 90·37 ; Huebl value, 71·12. The solid layer melted at 45°C. and solidified at 31°C. Its η_D was $+ 30$.

Palm Oil, Detection of, in Butter and Lard. E. Ewers. (*Pharm. Zentralh.*, 1910, **51**, 410 ; *Milchwirtsch Zentralb.*, 1910 [4].) Five Gm. of the melted filtered fat is saponified in the usual manner with 20 c.c. of alcoholic N/KOH as in the determination of the saponification value, until a clear solution results, and after 10 minutes' further heating, titrated with N/2 H_2SO_4. After driving off the alcohol, the soap is transferred, by means of hot water, to a graduated 250 c.c. flask and diluted to about 180 c.c. When cooled to 20°C. 50 c.c. of N/2 $MgSO_4$ solution (61·5 Gm. $MgSO_4 7H_2O$ in 1,000 c.c.) is added without shaking ; the flask is filled up to the 250 c.c. mark, and the contents well mixed by agitation. Then 200 c.c. (= 4 Gm. of original fat) is drawn off through a suction filter, and transferred to a 1,000 c.c. separator. The 250 c.c. flask is then washed out with 10 c.c. N/2 H_2SO_4 and this acid is added to the liquid in the separator,

in order to liberate the soluble Mg fatty salts. The solution is then shaken out with 50, 50, and 25 c.c. of petroleum ether in succession. The petroleum ether is then washed with 40 and 20 c.c. of water, and these washings are added to the first aqueous acid liquid in a 750 c.c. distillation flask. The mixture is treated with 1 c.c. of dilute H_2SO_4, and 250 c.c. is distilled off. The distillate is then titrated with N/10 KOH; with phenolphthalein indicator. The number of c.c. used is the "distillate Mg. value" and represents the saturation value of the water soluble Mg. fatty acids not removed by shaking out with petroleum ether. The petroleum ether is then titrated with N/10 KOH by shaking in a stoppered flask with 50 per cent. alcohol, phenolphthalein as indicator. The number of c.c. used gives the "petroleum ether Mg. value," representing the saturation value of the petroleum ether soluble fatty acids of the Mg. salts. Although palm oil and butter fat show a similar total magnesium value, the difference between the "distillation Mg. value" and the "petroleum ether Mg. value" is very pronounced. When the difference between the two values falls under 8 5 adulteration with palm oil is indicated. A difference of 6 3 to 8 5 indicates 10 per cent. of palm oil; of 4 4 to 6 2 about 15 per cent. and of 2 5 to 4 3 20 per cent. of added palm oil. To detect palm oil in lard the determination of the petroleum ether Mg. value is sufficient. With lard this is 0 or thereabouts. Five per cent. of palm fat raises this to 1 3 or 1 4; and 10 per cent. to 2 5 or 2 6.

Parsley-seed Oil, Unsaponifiable Constituents of. H. Matthes and W. Heintz. (*Ber. deuts. pharm. Ges.*, 1909, **19**, 325–328.) The oil examined was of a dark green colour, and had a bitter pungent taste. It dissolved readily in Et_2O, $CHCl_3$, and CS_2, and in a mixture of EtOH and Et_2O. Sp. gr. at 15°C., 0 9720; η_D at 40°C., 1 4624; saponification value, 190 9; and iodine value, 80 07. A solution of the oil in a mixture of equal parts of EtOH and Et_2O, yielded, on standing, a crystalline deposit. This fat contained an unsaponifiable portion composed of a yellow oil with an aromatic odour, and of crystals suspended in it. The crystalline part, after treatment with warm EtOH and repeated recrystallization from Et_2O, melted at 69°C., and had a composition corresponding to the formula $C_{20}H_{42}$, and a mean molecular weight of 289·1. To this hydrocarbon, which did not absorb iodine or give the phyto-

sterol reaction, the name "*petrosilane*" was given. It resembles the bryonane of Etard, *Bryonia dioica*, and that of Matthes and Sander, from fixed oil of bay berries, the latter, however, differed from petrosilane and bryonane in being soluble in boiling EtOH. Two hydrocarbons of the same composition and of similar form and solubility (m.p. 60·5° and 67°C.) were also found by Schwalb in beeswax. The solid portion of the unsaponifiable matter soluble in EtOH yielded a substance melting at 88°C., and corresponding in properties with melissyl alcohol, and crystals, melting at 133° to 145°C., giving the phytosterol reaction. These consisted of a mixture of several compounds. The liquid soluble portion, separated from the EtOH solution by chilling the liquid, was a yellowish-brown oil with an iodine value of 111·75 and η_D at 40°C. of 1·5154. The total quantity of the unsaponifiable matter in the parsley seed oil was about 14 per cent.

Phytosterols, Vegetable Cholesterol Alcohols. T. Klobb. (*Bull. Sci. pharm.*, 1910, **17,** 160, 228, 273.) A complete summary of all the published literature of this class of alcohols, accompanied by a complete table of all results, giving botanical source, nature of the phytosterol, formulae, m.pt., a_D, authors' names, and literary references.

Ricinodendron africanum, Fixed Oil of Seeds of. E. de Wildemann. (*Pharm. Zentralh.*, 1909, **50,** 1099.) These seeds contain 45 2 per cent. of a drying oil, having the following characters: Sp. gr. at 20°C., 0 9320; saponification value, 191 6; iodine value, 147 7; Hehner value, 95 2; titre value, 37 7°. The press cake is rich in nitrogen, has a high nutritive value, but contains no alkaloids.

Soap, White Castile. (*Evans' Analyt. Notes*, **1909,** 50.) A specimen of "genuine olive oil soap," of exceptional whiteness, was found to have been prepared from a mixture of oils. The fatty acids separated therefrom had the following characters: Iodine value, 69 4; titre value, 26°C.; η_D 1·453; Reichert-Meissl value, soluble 3 0, insoluble 2·75. The figures for the acids from genuine olive oil soap are: Iodine value, 79; titre value, 26; η_D 1·450; Reichert-Meissl value, soluble 0·5, insoluble 1·2. (See also *Y.B.*, **1907,** 148; **1908,** 184; **1909,** 168.)

Soya Bean Oil. (*Evans' Analyt. Notes*, **1909,** 52.) The oil from soy beans, *Glycine hispida*, is now largely used for soap-

making and for other technical purposes. It has the following characters: Sp. gr. 0·9263 to 0·927; η_D + 24 to + 27; acid value, 1·75 to 7·0; saponification value, 195 to 196; iodine value, 142; iodine value of fatty acids, 130·4.

Tussilago farfara Flowers, New Phytosterols in. T. Klobb. (*Comptes rend.*, 1909, **149**, 999.) In the course of an investigation of the cholesterol alcohols of the Compositae, two new phytosterols have been isolated from coltsfoot flowers. One of these, melting at 117°–119°C., is not yet completely examined. The other, faradiol, is characterized by the presence of two oxygen atoms in the molecule, having the formula $C_{30}H_{50}O_2$, or $C_{31}H_{52}O_2$, or $C_{29}H_{46}O_2$. Unlike the phytosterols of chamomile and of arnica (*Y.B.*, **1903,** 34; **1904,** 27) these bodies are not found in the petroleum ether extract of the flowers, but in the alcoholic extract. Faradiol crystallizes from alcohol in large orthochromatic prisms, and from acetone in rectangular tablets. The crystals containing alcohol of crystallization melt at 209°–211°C.; but if freed from this at 115°–116°C., the residual phytosterol melts at about 238°C. Its a_D = + 45·1°. Certain of its esters are described. These investigations show that the phytosterols of the Compositae may be classed in three groups: (1) Monovalent, laevo-rotatory alcohols, melting near 130°C., crystallizing from alcohol in lamellae, and generally forming hydrated crystals; (2) monovalent alcohols of high melting-point, crystallizing in needles; (3) bivalent dextro-rotatory alcohols, crystallizing from alcohol in large crystals melting at above 200°C.

GLUCOSIDES AND SUGARS

Aloin. O. A. Oesterle and G. Riat. (*Schweiz. Woch. Chem. Pharm.*, 1909, **47,** 717.) The authors do not agree with the statement of Léger (*Y.B.*, **1903,** 28) that aloin is not hydrolysed by the action of acids. They found that when 100 Gm. of aloin was heated on the water-bath under a reflux condenser for 80 hours with a mixture of 500 c.c. of 95 per cent. EtOH and 25 c.c. of H_2SO_4, and the mixture then set aside, in the course of a week or two a dark red precipitate was formed, which, when removed by boiling xylene, proved to be aloe-emodin. The mother-liquor contained a reducing substance, which afforded with phenyl-hydrazine a yellow, crystalline osazone, m.p. 208°–209°C. Aloin also forms aloe-emodin

and a reducing body when boiled with alcoholic HCl, hydrolysis taking place more rapidly than with H_2SO_4. In both cases besides aloe-emodin, an amorphous substance giving red solutions with alkalies is formed. This is probably the primary decomposition product of aloin, from which aloe-emodin is ultimately formed by oxidation. Aloe-emodin is also formed when aloin is heated to 70°–80°C. with Na_2O_2 and the mixture poured into dilute HCl. In this case, no sugar could be detected as a product of hydrolysis.

Amygdalin, Formation of a Biose Sugar from. J. G i a j a. (*Comptes rend.*, 1910, **150**, 793.) Following the announcement of the formation of a reducing biose, vicianose, from vicianin (p. 117) the author has isolated a biose but non-reducing sugar, by the action of the diastasic ferment of the Roman snail, *Helix pomatia*, on amygdalin. It had been previously noted that, after this hydrolysis, only one-third or one-fourth of the theoretical amount of sugar could be accounted for by chemical means. This is now explained by the formation of the biose which has been isolated, but not yet crystallized.

Arbutin and Methylarbutin, Characters of. E. B o u r q u e l o t and A. F i c h t e n h o l z. (*J. Pharm. Chim.*, 1910, **1**, 62, 104.) Pure arbutin has probably never been obtained; it has always been contaminated with methylarbutin. When it is hydrolysed, the quinol formed, as well as the dextrose, exercise a reducing action on Fehling's solution. The equivalents of Cu precipitated by given weights of quinol have now been determined, and are found to increase with the concentration of the solution. Methylquinol, the corresponding product of hydrolysis of methylarbutin, does not reduce Fehling's solution. Arbutin solutions give, as indicated by Schiff, a fine blue colour reaction with very dilute Fe_2Cl_6 reagent. Methylarbutin gives no colour, but its product of hydrolysis, methylquinol, does. Arbutin gives a fine blue tint with Jungmann's reagent (1 Gm. of sodium phosphomolybdate dissolved in 10 c.c. of strong HCl, and 20 c.c. of water). To a solution of arbutin 6 to 8 drops of this are added, followed by the same quantity of AmOH. Methylarbutin does not react with this reagent, but methylquinol does. When arbutin is submitted to the action of emulsin, the liquid, after the second day, becomes pink, and gradually darker, until it is yellowish-brown. Under similar conditions, the product of hydrolysis of methylarbutin by emulsin, provided it be pure, will

remain colourless for a month. If to the two emulsin fermentation liquids, a few drops of the oxydase ferment of *Russula delica* be added, before the arbutin has begun to change colour, a pink to deep brown-red colour appears in the arbutin solution in a few hours, whereas the methylarbutin solution will be only greyish-white to chamois-coloured after 48 hours. Hydrolysis of methylarbutin with emulsin proceeds much more rapidly than with arbutin. By comparing the weight of Cu precipitated by the products of hydrolysis of mixtures of arbutin and methylarbutin with the observed optical deviations before and after fermentation with emulsin, an approximation of the quantities of the two glucosides present may be calculated.

Asparagus, Two New Carbohydrates from. G. Tanret. (*Comptes rend.*, 1909, **149**, 48.) The subterranean parts and the green berries of asparagus contain considerable quantities of two new carbohydrates, asparagose and pseudo-asparagose; the former occurring in microscopic sphero-crystals which polarized light, the latter being amorphous. Asparagose belongs to the group of carbohydrates $(C_6H_{10}O_5)_nH_2O$, approaching the limit $C_6H_{10}O_5$. Cryoscopic results indicate that the molecule is a multiple of 15 or 16 of this. When hydrolysed it affords about 93 per cent. of levulose and 7 per cent. of glucose. Asparagose is not precipitated from aqueous solution in the cold by Ba2(OH) solution; it is precipitated, however, by a strong tepid solution, and is redissolved in excess of the precipitant. It is thrown down, however, by Ba2(OH) in the presence of EtOH, and is isolated by fractional precipitation of the purified aqueous extract of asparagus roots in this manner. Asparagose does not reduce Fehling's reagent, nor give a colour with iodine. Yeast invertin attacks it very slowly. The juice of asparagus roots contains about 6·7 per cent. of this body. Pseudo-asparagose is obtained from the mother liquors after removing asparagose by evaporating to dryness, and extracting the residue with boiling MeOH. The solvent is distilled off, and the residue fractionated with Ba2(OH) and EtOH. It is more soluble in EtOH and MeOH than asparagose. It yields 86 per cent. of levulose, and 14 per cent. of glucose on hydrolysis. It occurs in about the same quantity as asparagose. Neither of these carbohydrates are found in the shoots of asparagus as used as a vegetable nor in the ripe red berries of the plant.

Aucubin in Different Varieties of Aucuba. C. Lebas. (*J.*

Pharm. Chim., 1909, **30**, 390.) The author has found aucubin in all the following varieties of *Aucuba japonica*; *elegantissima*, *latimaculata*, *longifolia*, *punctata*, *salicifolia*, and *viridis*.

Bassia longifolia, New Glucoside from. B. Moore, F. W. Baker-Young, and S. C. M. Sowton. *B.M.J.*, 1909, **2**, 541. The seeds of *Bassia longifolia*, popularly known as mowrah seeds, are imported in large quantities from India on account of the high yield of oil used in making soap. The residue left after the expression of the oil is valueless for the manufacture of feeding cake for cattle because of its bitter taste. The attention of the authors was first called to the substance by the highly irritating action which it exerted when in contact with a cut surface or with the mucous membranes of the workers who were engaged in the manipulation of the meal after the oil had been expressed. At this time they were not aware of any similarity between the active substance and digitalis, but discovered it later when they came to perfuse the heart with the isolated glucoside. That the local action of digitalis was also highly irritating did not appear to be well known. It was this action which led them to an investigation of the chemical and physiological properties of the active substance.

The active substance was readily soluble in water or EtOH, but practically insoluble in Et_2O. It was therefore easy to obtain it in fairly pure condition by extraction with EtOH, decolourizing with animal charcoal, and precipitating with excess of Et_2O, drying over H_2SO_4. The substance was shown to be a glucoside, yielding about one-third of its weight as glucose on hydrolysis with acid. This sugar proved to be a hexose, yielding typical glucosazone crystals. Another one-third approximately consists of an organic acid, "mowric acid"; it possesses all the active properties of the mother glucoside, "mowrin," although in somewhat lessened degree, when tested in equi-molecular solution. The nature of the third hydrolysis product has not been established; it is probably a pentose. One of the most interesting properties is the powerful laking effects upon blood corpuscles in a saline suspension. This property is possessed much more strongly by the glucoside than by the salts of the separated mowric acid. The latter is quite a strong haemolytic, but the former is rivalled only by saponin. Both the glucoside and the acid are poisonous when given hypodermically, the glucoside, again, being more powerful than

the acid. Thus, 0·005 Gm. of the glucoside will kill a rat of 150 Gm. weight in about three hours; and 0·006 Gm. of the sodium salt of the acid did not kill. The effect of the glucoside on the heart in non-lethal doses resembles that of digitalis. It is suggested that the drugs of this group, which possess a common well-marked collection of characteristics, probably produce their effects upon the heart muscle in a kindred way, and that the bio-chemical basis for their action is an affinity of a physico-chemical kind between the glucoside molecule and the molecule of the heart lipoid.

Caragana arborescens, Glucoside from. E. Reeb. (*Pharm. Zentralh.*, **50,** 738.) This papilionaceous shrub, often cultivated in gardens, has bitter leaves, which contain a glucoside obtained in the form of yellow scales or an amorphous powder by the following process. The leaves are extracted with EtOH; the EtOH extract is evaporated to dryness, and the residue is re-dissolved in water, the solution filtered, and concentrated. The glucoside is then precipitated by saturating the solution with Na_2SO_4, and the precipitate is washed with a saturated aqueous solution of the salt. It is re-dissolved in EtOH; the solution is again evaporated to dryness and again treated, after solution, with Na_2SO_4. After several such treatments, the glucoside is re-dissolved, and further purified with $Pb2C_2H_3O_2$. Excess of this salt is removed with H_2S; the PbS is filtered out, and the filtrate allowed to evaporate spontaneously. The glucoside thus obtained gives a chestnut brown colour with H_2SO_4, and blue striae with that acid and ammonium molybdate. It affords a green colour with HNO_3; and a solution of it gives a peach-coloured ring with Lafon's reagent. It is precipitated by basic lead acetate. When heated with mineral acids, it is hydrolysed, yielding glucose. It is without action on the frog's heart.

Chlora perfoliata contains Gentiopicrin. E. Bourquelot and — Bridel. (*J. Pharm. Chim.*, 1910, **1,** 109.) Bourquelot's biological method having indicated the presence of a glucoside in all parts of the plant, this was isolated and identified as gentiopicrin (*Y.B.*, **1906,** 35). No other glucoside was present; and the gentiopicrin occurs in considerable quantity when the plant is in full bloom, as much as 1·5 per cent. calculated on the fresh material. Later on in the season, as the seeds approach maturity, this quantity diminishes.

Colchicum Seed, Amount of Glucose in. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 51.) J. C. Umney, having directed the author's attention to the varying amount of glucose present in them, has determined the amount in eight specimens, and in the tincture prepared from them.

	Extractive in Tincture.	Sugar in Extract of Tincture.	Sugar in Seed.
	Per cent.	Per cent.	Per cent.
1* . .	1·60	11·3	0·90
2* . .	1·60	17·0	1·35
3 . . .	2·14	28·8	3·08
4 . . .	2·26	28·7	3·24
5 . . .	2·38	36·0	4·28
6 . . .	2·90	36·1	5·23
7 . . .	2·90	36·1	5·23
8 . . .	3·80	36·9	7·00

* Museum Specimens.

The variation does not necessarily indicate the fraudulent addition of glucose, since the comparatively low price of colchicum seeds would hardly allow of a sufficient profit even if the highest quantity of glucose found were added, but the figures are important as showing a source of error if the strength of the tincture be judged from the amount of extractive yielded by it.

The fresh seeds as taken out of the capsules are usually sticky, the glucose probably being derived from the strophiole, but in the process of drying more or less of the glucose and strophiole may be rubbed off in proportion to the dryness or moisture of the seed. The determination of the amount of glucose in the fresh seed has not been made from lack of material. The author requests that ripe capsules of the wild plant should be sent to him to have this done.

Convolvulin, Glucosidal Acids of. E. Votocek. (*Berichte*, 1910, **43**, 476.) The convolvulin of jalap, according to Hoehnel (*Y.B.*, **1897**, 130) when hydrolysed with $Ba(OH)_2$ solution furnishes two glucosidal acids, convolvulinic and purginic acids. The former has not hitherto been obtained in a crystalline state. It is found that when kept for some months, it is transformed into a mass of minute silky radiating needles. When this acid is hydrolysed with 10 per cent. H_2SO_4, it is split up into convolvulinolic acid, glucose, a sugar, rhodeose, and an amorphous substance, iso-rhodeose, a name which has since been applied to

another sugar derived from purginic acid. Lately the author has established the identity of this so-called iso-rhodeose with rhamnose. The rhamnose from jalap convolvulin was apparently prevented from crystallizing by the presence of other substances. Rhodeose was shown, in 1902, to be the optical opposite of Tollens's fucose. It is now found to be a methylpentose :

$$\begin{array}{rcccccccl} & & OH & & OH & & OH & & \;\;O \\ & & | & & | & & | & & / \\ CH_3\cdot CH(OH) & - & C & - & C & - & C & - & C \\ & & | & & | & & | & & \setminus \\ & & H & & H & & H & & \;\;H \end{array}$$

Decylenic acid has been isolated from the hydrolysis products of purginic acid. The amorphous sugar, iso-rhodeose, accompanying this gives a crystalline osazone, m.p. 183 - 184°C., but the sugar itself has not been crystallized. Convolvulin gives, therefore, at least four sugars on hydrolysis, so its molecule must possess an extremely complex structure.

Eremostachys laciniata, Glucoside in. J. Khouri. (*J. Pharm. Chim.*, 1910, **1**, 17.) The biological method of Bourquelot indicates the presence of a glucoside, hydrolysed by emulsin in this Labiate. From the optical deviation observed this would appear to differ from those already recorded. It has not yet been isolated.

Garlic Bulbs, Chemical Constituents of.—Rundqvist. (*Apoth. Zeit.*, 1910, **25**, 108.) Garlic contains a sulphur containing glucoside, *alliin* ; this is hydrolysed by a special ferment, *allisin*, yielding essential oil of garlic and *fructose*. Alliin itself is odourless. Allisin is an oxydase. In addition to these garlic contains a peculiar tasteless carbohydrate, not coloured by iodine, but giving a bulky precipitate with $Ba(OH)_2$. When hydrolysed with dilute H_2SO_4 it yields fructose. It is identical with sinistrin. (This carbohydrate has been previously isolated and described by Chevastelon in 1894, *J. Pharm. Chim.*, 1910, **1**, 103.)

Gentiopicrin destroyed in Commercial Gentian Root by Fermentation, not by Drying. E. Bourquelot and — Bridel. (*J. Pharm. Chim.*, 1910, **1**, 156.) E. Bourquelot and H. Hérissey, have previously shown that the gentiopicrin, which is originally present in fresh gentian root, does not occur in the

commercial drug. This disappearance of glucoside is now found not to be due to simple drying, but to the process of fermentation to which the roots are subjected in order to improve the colour and aroma. If the root be quickly and carefully dried, as is done with other drugs, so as to avoid fermentation, the glucosidal constituents remain practically intact. Gentian root thus dried becomes a useful source of gentiopicrin. (See also *Y.B.*, **1901,** 66; **1903,** 214; **1906,** 350.)

Glucosides, Retarding Influence of Hydroquinone, Gallic Acid, and Tannin on Hydrolysis. A. Fichtenholz. (*J. Pharm. Chim.*, 1909, **30,** 199.) Hydroquinone exerts a very marked retarding influence on the hydrolysis of arbutin by emulsin; and since it is liberated in the course of this hydrolysis, it renders the process slow. In the case of salicin, gentiopicrin and amygdalin, it also exerts a retarding influence, but this is extremely slight. Gallic acid entirely arrests the hydrolysis of arbutin by emulsin, and almost completely that of aucubin. With the other glucosides experimented with partial hydrolysis took place in its presence varying in amount with different substances. Tannin also varies in its action, and in a different manner to gallic acid. Arbutin is partially hydrolysed by emulsin in its presence. The phenomenon is therefore more complex than has been supposed.

Honey, Artificial and Natural, Distinctive Test for. R. Lund. (*Zeits. Untersuch. Nahr. Genusmitt.*, 1909, **17,** 800; *Pharm. Zentralh.*, 1909, **50,** 799.) Natural honey contains proteids derived from the organisms of the bees. Artificial honey contains practically none. The author employs a solution of tannin to precipitate the albuminoids from solutions of honey, and measures the volume of the precipitate in a Barth's tube, such as is used for the determination of the tannin in wine. This is similar in principle to the Esbach tube used in urine analysis. Twenty c.c. of the filtered 10 per cent. solution of honey in distilled water is treated in the tube with 5 c.c. of 5 *per mille* tannin solution. The volume is then made up to 40 c.c., and the volume of the precipitate read off after standing for 24 hours. With artificial honey this will only amount to 0·03 c.c., while natural honey will show from 1·4 to 2·3.

Honey, Tests to distinguish Natural from Artificial. A. Jaegerschmidt. (*Z. Unters. Nahr.-und Genussm.*, 1909,

17, 671.) Artificial honey prepared from invert sugars when distilled during heating to incipient decomposition, yield distillates showing reactions for furfural, methyl furfural, and hydroxymethylfurfural derived from the caramelization of the sucrose during inversion. Thus the distillate from genuine honey gives no red colouration with aniline acetate, but that from commercial glucose syrup, even when mixed with 75 per cent. of genuine honey, gives a marked colouration. The distillates from genuine honey possess a pleasant aroma which is absent from those of artificial honey. The reaction with aniline acetate in the distillate from artificial honey sometimes requires a minute to develop, and is transient, often disappearing in about 15 minutes, but re-appears more faintly on the addition of acetic acid. If honey containing invert sugar be extracted with acetone, and HCl be added to the acetone extract, a red colour is developed

Intestinal Emulsin in Animals. P. Thomas and A. Frouin. (*Arch. internat. phys.*; *Bull. Soc. Chim.*, 1909, **7**, 302; 1910, **7**, 112.) The cells of the intestinal epithelium of animals contain an emulsin which hydrolyses glucosides. It is not found in the various digestive secretions, and is not of bacterial origin, and is found abundantly in the sterile fœtal intestine. This diastase readily passes into solution on macerating the intestinal tissues.

Ixora alba, Chemical Examination of. C. Schmitt. (*Bull. Sci. pharm.*, 1910, **17**, 203.) The roots of *Ixora alba*, besides resins soluble in Et_2O and in $CHCl_3$, contain a glucoside ixorin. This glucoside is hydrolysed with difficulty by acids, and gives a sugar which is not glucose. It possesses physiological paralysing action and is toxic. Aqueous solutions of the glucoside froth very strongly and are extremely bitter.

Linaria striata, Presence of a Cyanogenetic Glucoside in. E. Bourquelot. (*J. Pharm. Chim.*, 1909, **30**, 385.) Having noticed that browsing sheep avoid *Linaria striata*, the author has examined the plant by his biological method, and finds that it contains a cyanogenetic glucoside. The amount of HCN liberated was found to be 0·147 *per mille* of the fresh material, almost the identical quantity found in fresh elder leaves. Benzaldehyde accompanies this as a hydrolysis product. The amount of glucose formed is considerably in excess of that given by any known cyanogenetic glucoside. It is probable, therefore,

that there are two glucosides present in the plant, one of which yields HCN by hydrolysis.

Maple Sugar, Characters of. H. W. Cowles, junior. (*J. Ind. Eng. Chem.*, **1**, 773; *J.S.C.I.*, **28**, 1265.) The following standards are suggested: Maple sugar is the solid product from the evaporation of maple sap or maple syrup. It should contain not less than 0·65 per cent. of maple sugar ash, calculated on the anhydrous substance, and yield a clarified solution of maple syrup, containing not less than 0·45 per cent. of maple syrup ash. Maple syrup should contain not less than 0·45 per cent. of maple syrup ash, and not more than 34 per cent. of water.

Oleuropein, Varying Amount of, in Olives. E. Bourquelot and J. Vintilesco. (*J. Pharm. Chim.*, 1910, **1**, 292.) Oleuropein is found to occur in the greatest quantity in fresh green unripe olives, in July and early August, before the stones harden. It then gradually diminishes in quantity. When the olives are dried, about one-third of the glucoside disappears; and none remains in commercial olives. Power and Tutin (*Pharm. J.*, 1908, **27**, 714) were, according to the authors, unable to confirm the presence of the glucoside because they used an alcoholic extract of dried leaves; and further, they examined the resinoid residue insoluble in water. Since oleuropein is extremely soluble in water, any traces of it remaining in the leaves after drying would be removed by this treatment.

Polysaccharides, New, from Starch. F. Schardinger. (*Pharm. Zentralh.*, 1910, **51**, 50.) By the action of *Bacillus macerans* on starch solution at 45°C., two new polysaccharides, "crystalline amylo-dextrin" and "crystalline amylose" have been obtained. Neither reduce Fehling's reagent, nor are acted on by yeast. After the starch has disappeared, the solution is neutralized and evaporated. The crop of crystals thus obtained is first recrystallized from alcohol 50 per cent. and then from water. The amylo-dextrin is thus obtained in thick prisms, containing about 14·5 per cent. of H_2O; $[a]_D + 136–138°$; or $+ 158°$ for the anhydrous substance. Amylose is obtained from the mother liquor, after separating the amylo-dextrin. It does not crystallize from water, but separates from EtHO in lancet-shaped or acicular crystals; $[a]_D + 127·4°$. It gives greenish-blue cruciform needles with I. Aqueous solutions of amylo-dextrin are coloured yellow with I solution; amylose, yellowish brown.

Primula officinalis, Two New Glucosides in. A. Goris and M. Mascré. (*Comptes rend.*, **149**, 947.) The subterranean organs of *P. officinalis* contain two laevo-rotatory glucosides which have not been previously isolated. *Primeverin* occurs in white crystals, m.p. 172–173°C.; a_D — 60·24°; slightly reducing Fehling's solution. *Primulaverin*, in white needles; m.p. 160–161°C.; a_D — 66·86°; also slightly reducing Fehling's reagent. Both are hydrolysed by boiling with dilute mineral acid, with the production of an anise-like odour and the formation of a sugar not yet identified. They are both hydrolysed by a ferment, *primeverase*, which accompanies them in the plant, but not by emulsin, nor by other organic ferments. Other analogous glucosides doubtless occur in other members of the natural order, since many of these plants give a peculiar odour when bruised. In fact, they may be classed in three groups. The first includes those giving the above noticed anise-like odour, *P. officinalis*, *P. capita*, and *P. denticula*. The second comprises those giving off the odour of methyl or amyl salicylate; *P. longiflora*, *P. elatior*, *P. vulgaris*, and others, The third includes plants with the odour of coriander: *P. auricula*, *P. panonica* and *P. palinuri*.

Raffinose in Leguminous Seeds, in Erythrina fusca and in Entada scandens. E. Bourquelot and M. Bridel. (*J. Pharm. Chim.*, 1909, **30**, 162.) Raffinose is a hexotriose, $C_{18}H_{32}O_{16}$, which, when hydrolysed by mineral acids, gives a molecule of laevulose, of dextrose, and of galactose. By invertin it is only partially hydrolysed into laevulose and melibiose.

$$C_{18}H_{32}O_{16} + H_2O = C_6H_{12}O_6 + C_{12}H_{22}O_{11}$$

To complete the hydrolysis the intervention of melibiase, a ferment which occurs in the emulsin of almonds, is necessary. Applying these two ferments successively to the seeds of *Erythrina fusca* and of *Entada scandens*, by the author's biological method, the presence of raffinose has been demonstrated. The sugar was isolated in a crystalline state and its identity established.

Sambucus nigra, Hydrocyanic Acid in. C. Ravenna and M. Tonegutti. (*Chem. Zentr.*, 1910, **1**, 544.) The enzyme which decomposes sambunigrin, in the common elder, is insoluble in water. The HCN is contained in the plant in the form of the glucoside and is present in larger quantities than generally stated. The stalks contain more HCN than other parts of the plant.

Sapindus emarginatus Fruits, Saponin of. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 50.) A sample of these soap nuts (*Sapindus emarginatus*, Willd. (?) was forwarded to the Museum with the request that the relative richness in saponin might be determined. In the various countries where different species occur, they are commonly used for cleaning textile materials, and even for personal use in the form of hair-wash, etc. The fact that they are rich in saponin, but that it is usually accompanied with a dark-coloured matter possessing a disagreeable taste, suggested that if the saponin could be separated in a colourless form it might be available for the purposes for which quillaia and other similar materials are employed. J. C. Umney has examined these "soap nuts" and finds that the fruits yielded 54 per cent. of pericarps and 48 per cent. of seeds. The dried pericarps were mixed with half their weight of MgO, and extracted with MeOH. The solution was evaporated to dryness, mixed with MgO, and again extracted with EtOH. The yield of crude saponin was 41·9 per cent. of the pericarps. It was purified by precipitating it from the EtOH by Et_2O, repeating the process several times. When freshly precipitated it was nearly white, but on exposure to air it became reddish-brown in colour, and was, therefore, extremely difficult to purify. The crude saponin was a brownish substance, very soluble in water, less soluble in hot EtOH, and sparingly soluble in Et_2O. The aqueous solution was neutral to litmus, and gave no precipitate with acids nor with neutral or basic solutions of lead acetate, and the lead process is not, therefore, of any use in extracting it. It produced considerable frothing, even in very dilute solutions. It appears to consist entirely of neutral sapotoxins, which, according to Bourcel and Chevallier, are decidedly poisonous; for medicinal use, therefore, it is not suitable. The difficulty of preparing it in a pure state would make it an expensive product to produce on a large scale, unless duty-free alcohol were used. Umney refers to the investigation of O. B. May on fruits of *Sapindus rarak*, DC., who gives a full account of the literature of the subject and the various processes used for the extraction of the various saponins. He found only one variety of saponin in *Sapindus* fruits, but that different species of *Sapindus* required different kinds of treatment. He found the lead method employed by Krushal in the preparation of saponin from *Sapindus saponaria* failed completely when tried on *Sapindus rarak*, and the same was true with the barium method. For *Sapīdus rarak* he found the MgO method,

as above described, the most satisfactory. Care must be taken not to heat or evaporate the solution if it has an acid reaction. Even the natural acid in the aqueous extract decomposes the saponin solution readily. The best test is its foaming property and the haemolytic test. *Sapindus* saponin, as derived from *S, rarak*, is described as an amorphous colloidal substance optically inactive, freely soluble in water, sparingly in alcohol and acetone, insoluble in ether, acetic ether, chloroform, benzol, and carbon bisulphide. Its solution of 1 part in 10,000 parts of water is sufficient to produce frothing when shaken. Elementary analysis gave results in accordance with the formula $C_{16}H_{28}O_{10}$. It may be added that in the case of *Sapindus rarak* May found that neither the lead nor the barium method succeeded in precipitating the saponin from that species.

Stachyose, Presence of, in Labiates. L. Piault. (*J. Pharm. Chim.*, 1910, **1**, 248.) The biological method has demonstrated the presence of stachyose in the subterranean parts of the following labiates: *Lamium album*, *Stachys lantana*, *S. sylvatica*, *S. recta*, *Origanum vulgare*, *Mentha sylvestris*, *Ballota fetida*, *Clinopodium vulgare*, *Salvia splendens*, and *S. pratensis*. The sugar has been isolated in a crystalline state from all.

Thalictrum, Occurrence of HCN in the Genus. L. van Itallie. (*Archiv. Pharm.*, 1910, **248**, 251.) All the parts of the plant of *Thalictrum aquilegifolium* examined in the fresh young state yielded HCN, the maximum quantity 0 1 per cent. being obtained after hydrolysis with emulsin, when practically twice as much HCN, was yielded as was obtained by distillation after maceration. By direct distillation a lower yield of 0 02 or 0 03 per cent. was observed. The highest figures were got with the June gathered plant; very little was obtained in September. This, however, is due to the state of growth; since young leaves, gathered in September from plants cut down in July, yielded as much HCN as the June crop. The white-flowered variety gave slightly more acid than that with red flowers. The glucoside which yields HCN was not isolated. It is probably allied to linamarin. Besides *Thalictrum aquilegifolium*, the seeds of *T. angustifolium* gave indications of the presence of HCN, but the seeds of the following members of the genus gave negative results: *T. alpinum*, *ambiguum*, *chelidonii*, *cornuti*, *corynellum*, *delavayi*, *dioicum*, *flavum*, *fetidum*, *fortunei*, *glaucum*, *isopyroides*, *japonicum*, *javanicum*, *laserpitii*-

folium, macrocarpum, minus, pauciflorum, petaloideum, silvaticum, simplex, sparsiflorum, squarrosum, tuberosum.

Veronica officinalis and V. chamaedrys, Glucosides in. J. Vintilesco. (*J. Pharm. Chim.*, 1910, **1**, 162.) The biological method of Bourquelot reveals the presence of what are probably identical glucosidal constituents in *Veronica officinalis* and *V. chamaedrys.* Of these the former shows the greatest amount, and both plants contain most glucoside when the vegetative activity is at its maximum. The glucoside has not yet been isolated. It is accompanied by a ferment, which is active on sucrose, on amygdalin, and on salicin, as well as on the *Veronica* glucoside.

Vicianose, a New Reducing Sugar from Vicia angustifolia. G. Bertrand and G. Weisweiller. (*Comptes rend.*, 1910, **150**, 180.) The authors have previously demonstrated the presence of a cyanogenetic glucoside in *Vicia angustifolia,* and have shown that, this vicianin, differs from amygdalin by the nature of the sugar, which is formed by hydrolysis. This sugar has now been isolated and proved to be a new reducing biose, vicianose. After standing for several months this sugar, obtained by the action of the specific ferment vicianase on vicianin, and fractionating the product from alcohol, has been obtained in a crystalline state. It forms small colourless needles several mm. long, aggregated in spheres or forming crusts, like mannite; very soluble in water; showing multi-rotation in aqueous solution; lessening gradually until the sugar had been dissolved 22 hours, when it became stationary at $[\alpha]_D + 39°72'$. It had the formula $C_{11}H_{20}O_{10}$. The taste is slightly sweet. It is not attacked by baker's yeast. It is the first biose to be obtained by the diastasic hydrolysis of a glucoside.

GUMS, OLEO-RESINS AND RESINS

Acacia Gums, Ferments of, and of Certain Other Gums. F. Renitzer. (*Chem. Zentralb.*, 1909, **2**, 1258.) At least three kinds of enzymes may be present in gums; an oxydase, a peroxydase, and a diastase. The latter appears to be a mixture of at least two enzymes, since the addition of $HgCl_2$ arrests the formation of sugar in cold and warm solutions, whereas, under these conditions, starch continues to be rendered soluble, and erythrodextrin to be formed. The oxidising and

diastasic action varies in different gums. Those which have an acid reaction contain an active oxydase. Certain gums do not contain this enzyme, but hard Kordofan gum gives a marked reaction for it by the guaiacum test. Tyrosinase is not present. Since the gums are free from manganese, or only contain minute traces thereof, the reaction must be due to an active oxydase. It is destroyed by heating for eighteen hours at 70°C., or by one hour's exposure to steam heat. Peroxydases are readily detected in gums which contain but little or no oxydases; they are destroyed only after heating for 48 hours at 70°C. The amylase of gum not only converts starch paste into dextrin, but into maltose. Insoluble gums and plant mucilage are neither rendered soluble nor converted into sugar by gum-amylase; it is only active on starch paste. No distinctive characters between gum-amylase and malt-diastase can be detected. The sugar-forming ferment is either entirely held back by passage of the gum solution through a clay filter, or so little passes through that the sugar is formed only after prolonged reaction.

Acacia pycnantha, A. horrida, A. arabica and Melia azadirachta Gums, Chemical Constituents of. E. Meininger. (*Archiv. Pharm.*, 1910, **248**, 171.) *Gum of Acacia pycnantha.* Moisture, 13·55 per cent.; ash, 0·92 per cent., of which 0·28 per cent. was Ca and 0·123 per cent. Mg.; insoluble matter, 0·64 per cent.; a_D − 19·39°. The arabinic acid isolated from this gum contained 43·44 per cent. of C, 6·24 per cent. of H, 50·32 per cent. of O, and 1·31 per cent. of N. The N content of the original gum is 2·19 per cent. On hydrolysis 58·61 per cent. of galactone, 16·98 per cent. of pentosane, and 2·92 per cent. of methyl pentosane, are obtained. The greater part of the gum is an arabo-galactane. *Gum of Acacia horrida.* Moisture, 15·34; ash, 2·59 per cent., including Ca 1·06 and Mg. 0·345 per cent.; insoluble matter, 0·98 per cent.; a_D + 53·94. The arabinic acid gave: C, 44·67; H, 6·19; O, 49·14; N, 0·71 per cent. The N-content of the original gum was 1·51 per cent. Hydrolysis gave pentosane 36·5; methylpentosane 2·82, and galactane 27·36 per cent. *Gum of Acacia arabica:* Moisture, 14·39; ash, 2·41, containing Ca 0·765 and Mg. 0·106 per cent.; N. 1·39 per cent. Hydrolysis gave pentosane 50·43 and galactane 21·85 per cent. *Gum of Melia azadirachta:* Moisture, 15·41; ash, 2·99, containing Ca 0·76 and Mg. 0·294

per cent. Insoluble matter, 0·27 per cent.; α_D – 57·16°. Hydrolysis gave pentosane 26·27; galactane, 11·11 per cent. The galacto arabane of the gum consists of laeva-arabinose and dextro-galactose in the proportion of 1 : 2. The gum contains 4·49 per cent. of N. In addition to the above gums, the percentages of N found in the following were: *Acacia adansonii*, 1·93; *A. senegal*, 1·81; *Feronia elephantum*, 1·53; *Anacarelium occidentale*, 0·92 per cent.

Acaroid Resin, Red. L. E. Andés. (*Chem. Rev. Fett. Harz-Ind.*, 1909, **16**, 160; *J.S.C.I.*, 1909, **28**, 802.) Of the various species of *Xanthorrhoea*, *X. drummondii* (W. Australia) is reputed to afford most resin, a single tree yielding an average of 23 kilos. of a yellow resin. *X. tateana* (S. Australia and Kangaroo Island) furnishes a ligneous, vesiculated, readily friable and odourless resin. The mass is dark red; the powder is yellowish and imparts a blood-red colour to hot water. Petroleum ether extracts 1 per cent. of a colourless odourless resin; strong EtOH dissolves it entirely, forming a fiery red solution, which deposits crystals of benzoic acid on evaporation. *X. hastilis* (N.S.W. and Queensland) produces a resin of sweetish odour, resembling that of benzoin; it is readily friable, the powder resembling gamboge and undergoing change of colour when exposed to light. It melts in boiling water, rendering the latter turbid and yellow. Petroleum ether extracts 1 per cent. of a pleasant-smelling substance; EtOH dissolves 94 per cent., and the solution affords feathery crystals of benzoic acid on evaporation. The purified resin melts at 97·7°C. Another sample, showing a lower melting point, yielded to petroleum ether 2 per cent. of a faintly coloured viscous body, probably composed of essential oils and resin. *X. arborea* (N.S.W. and Queensland) furnishes compact pieces mixed with leaves; the colour of the product varies from purple brown to carmine red. It forms a readily friable powder, of the colour of raw sienna, and tastes like benzoin. Petroleum ether extracts 8 per cent.; EtOH, 92 per cent.; the EtOH extract deposits crystals of benzoic acid, but in less quantity than the other *Xanthorrhoea* resins. *X. australis* (Tasmania and Victoria) affords irregular-shaped spheroidal masses of friable resin of a dark red colour, in the fused state resembling dragon's blood. Its EtOH solution is clearer than those of the resins of other species of *Xanthorrhoea*.

Ammoniacum. (*Evans' Analyt. Notes*, **1909,** 7.) *Powder.*—The ash content of two batches of the powdered drug was found to be 5·2 and 5·87 per cent. respectively.

Mass.—A sample of the "mass" variety yielded 3·92 per cent. of ash and 36·8 per cent. insoluble in 90 per cent. alcohol.

Nodules.—Using the method of Dieterich, the following figures were obtained: Acid value, 112; saponification value, 140; ash, 16 per cent. (See also *Y.B.*, **1900,** 404; **1903,** 244, 246.)

Asafetida. (*Evans' Analyt. Notes*, **1909,** 11.) Of 8 samples 2 were found to contain 29·95 and 42·85 per cent. of mineral matter respectively. Two consignments of "tears" yielded less than 3 per cent. A corresponding variation was displayed by the proportion soluble in 90 per cent. alcohol. This ranged from 36·3 to 77·4 per cent.

Although 3 of the year's samples have satisfied the requirements of the B.P., the official drug is not always obtainable. A limit of 15 per cent. of ash would probably prove to be satisfactory. (See also *Y.B.*, **1909,** 13.)

Benzoin, Siam, Constituents of. F. Reinitzer-Gratz. (*Pharm. Zeit.*, 1909, **54,** 791.) Since Siam benzoin originally exudes as a milk-white substance it cannot contain, in the unaltered condition, the brown siaresinotannol which Luedy considered to be its main constituent. Siam benzoin, in loose, almond-like pieces, is entirely crystalline. It melts at 59°C., and, by warming between 40–50°C., it is changed to yellowish, red, and brown, and becomes amorphous, due to oxidation. The pure crystalline substance, *lubanol*, is the benzoate of a resin alcohol, which forms colourless, monociinic crystals, melts at 72·8°C., and undergoes changes on heating similar to those of the original benzoin. It gives a green colour with Fe_2Cl_6, and yields a new crystalline substance when benzoylated. Lubanol benzoate affords Liebermann's and Salkewski's reactions, and gives a fine blue colour when warmed with chloral hydrate. Besides this, Siam benzoin contains another crystalline constituent, *siaresinol*, occurring in handsome prismatic needles, melting at 279°C., and giving dextro-rotatory solutions with alcohol. It is the benzoate of a substance similar to Luedy's benzo-vitriol. The sodium compound is very soluble in water, and crystallizes from alcohol in long needles. Siaresinol is not affected by oxygen, is not altered in colour at 40–50°C., and gives no colour reaction with ferric chloride, but affords Liebermann's and

Salkowski's reactions. A third amorphous benzoate occurs in Siam benzoin, which turns red at ordinary temperatures, may be further benzoylated, is readily saponified, and is separable by CS_2 into two constituents. By prolonged heating at 100°C. in alkaline solution this amorphous substance is converted into Luedy's siaresinotannol. (See also *Y.B.*, **1893,** 164; **1894,** 171.)

Dammara vitensis (Agathis vitiensis) Resin from Fiji. (*Bull. Imp. Inst.*, 1909, **7,** 274.) The resin was of a large uniformly yellowish-brown opaque mass, with occasional semi-translucent streaks. It had a slight odour of turpentine oil. Ash, 0·06 per cent.; m.p. (of the powdered resin in a capillary tube), 110–115°C.; acid value, 157. The resin was partially soluble in turpentine oil and in C_6H_6, completely soluble in a mixture of turpentine oil and alcohol, almost insoluble in Et_2O, EtOH, and $CHCl_3$. It somewhat resembles Manila and Macassar copals, and may conveniently be known as Fiji copal.

Lac, Crude. D. Hooper. (*Ann. Rep. Indian Museum, Industrial Section*, 1908–9, **7.**) The following values were obtained on analysis of the four more important kinds of crude lac:—

Lac.	Botanical Source.	Water.	Resins.	Colouring Matter.	Residue.	Ash.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Kusum	*Schleichera trijuga* .	1·8	85·6	2·5	9·1	1·0
Ficus .	*Ficus*	1·8	83·9	2·6	10·2	1·5
Ber .	*Zizyphus jujuba* .	2·0	82·7	2·4	11·5	1·3
Palas .	*Butea frondosa* . .	2·4	77·4	4·3	14·1	1·8

Kusum lac contains the largest amount of light-coloured resin and the smallest amount of impurities. The average iodine value was 11·4 per cent. The amount of resin in Keri or refuse lac was found to vary from 55 to 72 per cent. Burmese, obtained in a new process of shellac manufacture, gave only 15·5 per cent. of resin.

Loango Copal. A. Tschirch and M. Willner. (*Archiv. Pharm.*, 1910, **248,** 265.) The ether soluble portion of the copal yields, on shaking out with Am_2CO_3 solution: α-loango-copalic acid, $C_{20}H_{36}O_2$, 18 per cent., giving a Pb salt, insoluble in EtOH; β-loango-copalic acid, $C_{15}H_{30}O_2$, 12 per cent., not precipitated by $Pb2C_2H_3O_2$. Na_2CO_3 solution removes: Loango-copalolic

acid, $C_{18}H_{34}O_2$, 25 per cent., with a Pb salt insoluble in EtOH; α-loango-copaloresene, 5 per cent., soluble in Et_2O; and essential oil, 5 per cent. The portion of the copal then soluble in EtOH–Et_2O, amounting to 35 per cent., gave when shaken out with NaOH solution: Loango-copalinic acid, $C_{24}H_{44}O_2$, 15 per cent., soluble in hot alcohol; β-loango-copaloresene, $C_{23}H_{46}O_2$, 17 per cent., insoluble in Et_2O and in hot EtOH, but soluble in a mixture of EtOH and Et_2O. The ash amounted to 3 per cent.

Peruvian Balsam, Characters of. (*Schimmels' Report*, Oct., **1909**, 138.) The sp. gr. of pure Peruvian balsam lies between 1·144 and 1·154 at 15°C. Consequently the maximum limit of the Ph.G. IV, 1·150, is too low. The cinnamein may fall as low as 55 per cent. The ester number of this varies from 232 to 242. The Ph.G. IV. gives 236 as the lower limit.

Podophyllum peltatum and P. emodi Resins. W. S. Scoville. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 897.) After reviewing the literature, in full, of the controversy concerning the therapeutic value of the resins of *P. peltatum* and *P. emodi*, the author states that the colour of the solution is sufficient to distinguish the two resins: that of American podophyllin is reddish-brown, while that of Indian podophyllin is olive greenish; this is specially marked in benzol and $CHCl_3$ solutions. The proportion of each resin soluble in the usual organic solvents is given, with the m.p. of most of the portions so dissolved. In all cases there were mixtures. Both the methods of Dunstan and Henry and of Gordin and Merrell for the determination of picropodophyllin were tried with each resin; the amount obtained from the resin of *P. emodi* was 63·2 and 62·7 per cent., as compared with 24·04 and 25·7 per cent. from *P. peltatum* resin; indicating that the resin of the Indian drug was richer in the isomeric podophyllotoxin than the American. The residue from both processes was impure and gave no sharp melting point, so that the substance weighed as pure picropodophyllin was evidently far from pure. By using $CHCl_3$ as the extracting solvent instead of EtOH in Dunstan and Henry's process, 25·6 per cent. of picropodophyllin was obtained from *P. peltatum* resin, and 51·7 from that of *P. emodi*. It is evident that by the best methods of determination at present known, *P. emodi* resin contains about twice as much podophyllotoxin as that of *P. peltatum*. On dissolving the two resins in $CHCl_3$, and pouring the solution into petroleum ether, the resins were more easily

precipitated than the podophyllotoxin, so that the latter was separated by fractional precipitation in this way. The product was finally purified by fractional crystallization from C_6H_6. About 3 per cent. of pure white podophyllotoxin, m.p. 117, was thus obtained from *P. peltatum* resin, and 16 per cent. from that of *P. emodi*, m.p. 117·5°C.; the latter had a faintly green colour. These are being compared by pharmacological methods.

Podophyllum Resin, adulterated with Aloes. J. H. Williams. (*Pharm. J.*, 1910, **30**, 608.) A sample of podophyllin adulterated with 25 per cent. of powdered aloes has been met with. The admixture was detected by its solubility in water. The adulterated sample complied with the tests of the B.P. and of the B.P. Codex.

Scammony and Scammony Resin, Scheme for the Analysis of. P. Guigues. (*Bull. Sci. pharm.*, 1909, **16**, 448.) NATURAL SCAMMONY.—Carefully bulk the drug so as to obtain a representative sample. *Moisture*: Dry from 8 to 10 Gm. of the scammony to constant weight at 105°C. The loss should be from 8 to 10 per cent. Calculate all the other results to terms of dry material. *Ash*: Incinerate 2 Gm. The ash should be 5 to 6 per cent. *Resin*: Rub down 10 Gm. of the scammony with a few c.c. of tepid water. Add 40 to 50 Gm. of alcohol 95 per cent. to the emulsion, and filter. Treat the residue with a similar quantity of alcohol, and again filter. Wash the marc and filter with more alcohol and bulk the alcoholic filtrates. Evaporate or distil off the alcohol in a tared flask; wash the residue first with tepid, then with cold water. Wash the adhering resin off the stirrer with a little alcohol, and add this solution to the moist washed resin; dry to 105°C. and weigh. *Identification of resin*: Take 4 to 5 Gm. of the above dry resin, dissolve it in about 100 c.c. of alcohol 95 per cent., add 4 or 5 Gm. of animal charcoal; agitate until the colour is discharged, then filter. Determine the optical rotation of the solution in a 200 mm. tube, expressing the observed rotation as r. Measure out exactly 10 c.c. of the solution, and determine the amount of resin therein dried at 105°C. This weight $= P$. Then calculate the a_D by the formula $a_D = \frac{100\ r.}{2P}$ It should not be above $-25°$ nor below $-18°30'$; and generally approximates to $-24°$. All rotations below $-18°$ indicate the presence of coniferous resin; and above $-25°$ adulteration with jalap

resin. Guaiacum resin, which has a rotation about $-17°$, must be detected by its blue colour-reaction with oxidizing reagents.

SCAMMONY RESIN.—*Moisture*: As above. Should not exceed 5 or 6 per cent. *Ash*: Should not be appreciable. *Resin*: Dissolve 10 Gm. in 90 per cent. alcohol, filter, wash and dry as in scammony. Wash the dry resin as above and finally dry at 105°C. before weighing. Examine the resin in alcoholic solution, polarimetrically as above. *Detection of foreign resins*: Dissolve 0·5 to 1 Gm. in a few c.c. of dilute NaOH or Na_2CO_3 solution. Neutralize with an acid. Any marked precipitate indicates presence of coniferous resins. An alcoholic solution of the resin should give no blue colour with Fe_2CH_6 (absence of guaiacum resin.) (See also *Y.B.*, **1904**, 241; **1906**, 108; **1907**, 145; **1908**, 457, 462; **1909**, 45, 81, 123.)

Scammony, Commercial, Ether Soluble Resin in. (*Evans' Analyt. Notes*, **1909**, 49.) Twelve samples examined yielded from 19·9 to 84·0 per cent. of resin soluble in Et_2O. The Aleppo variety of to-day is quite different from that of former years, and more resembles "skilleep." Three samples labelled "Aleppo" contained from 19·9 to 23·8 per cent. of ether soluble matter.

A small specimen labelled "scammony extract" was found to contain 34·7 per cent. of Et_2O soluble matter. The balance was made up of starch and other inert matter. It possessed little of the characteristic odour of the ordinary drug.

Scammony Resins, Valuation of. W. B. Cowie. (*Pharm. J.*, 1909, **29**, 802.) It is shown that the supposed discrepancies observed by Taylor between his own figures and those of the author on the saponification of the resins of scammony are due to different methods of expression, Cowie's figures being for saponification equivalents, whereas Taylor's are saponification values. It is shown that when the two series of result are expressed in common terms they are in close accord. (See *Y.B.*, **1908**, 458.)

Sierra-Leone Copal. A. Tschirch and M. Willner. (*Archiv. Pharm.*, 1910, **245**, 285.) About 60 per cent. of the copal is soluble in Et_2O. This Et_2O yields: To Am_2CO_3 solution: Leone copalic acid, $C_{25}H_{48}O_3$ 28 per cent., giving a Pb salt, insoluble in EtOH. To Na_2CO_3 solution: Leone copalolic acid $C_{21}H_{38}O_2$, 30 per cent., forming a Pb salt insoluble in EtOH;

α-Leone copaloresene 8 per cent., soluble in Et_2O; essential oil 1 to 2 per cent. The portion of the copal, about 40 per cent., then soluble in a mixture of EtOH and Et_2O to NaOH solution: Leone copalinic acid, $C_{14}H_{24}O_2$, 15 per cent., soluble in hot EtOH; β-Leone copaloresene, $C_{14}H_{26}O_2$, 20 per cent., insoluble in Et_2O. Besides these a bassorin-like substance, 5 per cent., is present, with 2 to 3 per cent. of ash.

Storax. (*Evans' Analyt. Notes,* **1909,** 58.) Five out of nine samples examined were grossly adulterated. Of these three gave respectively 80, 46, and 72 per cent. of matter soluble in petroleum ether, after heating the material at 100°C. to drive off volatile matter. The adulterant was mainly fat. Pure dry storax yields but little to this solvent. Another test for the detection of fatty matter is the following: Four Gm. of the undried material is mixed with 9 c.c. of absolute alcohol and the solution is made up to 40 c.c. with alcohol 90 per cent. at 20°C. After shaking for a few minutes, then filtering and exposing the filtrate on ice for about 6 hours, the presence of fat will be shown by the formation of a flocculent precipitate. In determining the cinnamic acid in storax, the solution, after saponification, is shaken out with $CHCl_3$. The $CHCl_3$ extract is then shaken out with NaOH solution. The alkaline solution is then treated with excess of mineral acid, and the precipitate collected on a Gooch crucible. From this the cinnamic acid is washed out with boiling water. If the acid be titrated directly with alkali in the $CHCl_3$ extract from the saponification liquid, as is done with Peruvian balsam, erroneous results may be obtained.

Styracin from Storax. O. Langkopf. (*Pharm. Zentralh.,* 1910, **51,** 323.) In the course of the purification of storax with EtOH, on allowing the alcoholic solution to stand, or on distilling off a portion of the solvent, a white cauliflower-like crystalline deposit is formed. This proved to be styracin, cinnamylcinnamic ester, m.p. 44°C.

Tolu Balsam, Test for. Fleissig. (*Schweiz. Woch. Chem. Pharm.,* 1909, **47,** 365.) The various official methods for determining the free acid and saponification value of Tolu balsam are not so satisfactory as the following tests originally suggested by Merck:—1 Gm. of the balsam is dissolved in 50 c.c. of EtOH, and treated with 6 c.c. of N/2 KOH solution; a little phenol-

phthalein solution is added, and then 200–300 c.c. of water. The solution should be distinctly red, or become so on adding 1 drop of the standard alkali. The excess of alkali may then be determined by titrating back with N/2 HCl. To determine the saponification value, 1 Gm. of the balsam and 20 c.c. of N/2 KOH are heated together on the water-bath for thirty minutes, then diluted with 200 to 300 c.c. of water, treated with 10 drops of phenolphthalein, and titrated back with N/2 HCL. From 13·2 to 14·5 mils of the latter should be necessary.

INORGANIC CHEMISTRY

Ammonia Solution, Detection of Pyridine in. H. Kunz Krause. (*Apoth. Zeit.*, 1910, **24**, 87.) Eleven or 12 c.c. of 1 : 10 solution of ammonia in a test tube, the mouth of which can be closed with the thumb, is treated with 5 Gm. of powdered tartaric or citric acid, added gradually. Before the addition of the last portion of powder, the contents of the tube must be shaken up strongly. When all odour of NH_3 has disappeared, while the liquid is still warm from reaction, it should be perfectly odourless. The least trace of pyridine may be detected by its characteristic odour. The solution of the ammonium salt may then be used to test for the presence of metals. (See also *Y.B.*, **1909**, 50.)

Ammonia Solution, Determination of Pyridine in. A. C. Houghton. (*Apoth. Zeit.*, 1909, **24**, 957. *J. Ind. Eng., Chem.*, **1909**, 698.) One hundred c.c. of the AmOH solution is diluted with 150 c.c. of water and neutralized with 1 : 3 H_2SO_4 against methyl-orange. Five c.c. of N/NaOH solution is then added, and the mixture is distilled. The gas evolved is led through 100 c.c. of a solution of sodium hypobromite (Br 25 c.c., NaOH 100 Gm., water to 1000 c.c.) and then into a known volume of N/10 H_2SO_4. The NH_3 given off is thus decomposed by the hypobromite, liberating N, but the pyridine is not affected and passes on into the N/10 acid. Its quantity is then found by titrating back the excess of acid.

Ammoniated Mercury Ointment, and other Mercurial Ointments, Assay of. J. R. Rippeton. (*Amer. J. Pharm.*, 1910, **82**, 223.) From 2·5 to 3 Gm. is treated in a wide mouth flask with 50 c.c. of Et_2O to dissolve the fats. Ten c.c. of hydrochloric acid, 1 : 10, is then added, and 10 c.c. of water, the

mercury salt being dissolved by agitation. The acid liquid is then removed in a separator and the ether washed with successive portions of water until free from Cl. The bulked acid solution and washings are then treated with H_2S. The precipitated HgS is collected on a tared Gooch crucible, washed, dried to constancy at 100°C., and weighed. The weight obtained $\times 1{\cdot}0837 =$ the weight of ammoniated mercury. The method of simply removing the fats with a solvent, and weighing the insoluble residue, is stated to be unsatisfactory. (See also *Y.B.*, **1907,** 103.)

Ammonium Benzoate U.S.P. Tests for. A. Seidell and G. A. Monge. (*Amer. J. Pharm.*, 1910, **82,** 12.) The litmus test for the presence of free acid and the so-called melting point test are shown to be valueless. The quantitative determination of ammonia is suggested for inclusion, the process to be conducted as follows. About 0·5 Gm. of the salt dissolved in water and made alkaline with 50 c.c. of N/10 NaOH solution, is distilled into 50 c.c. of N/10 H_2SO_4 solution. The excess of this acid remaining after the distillation is completed should use up not more than 14·1 c.c. of N/10 AmOH, with cochineal indicator.

Ammonium Nitrate, fused to separate Certain Metals. L. Loviton. (*Annales Chim. Analyt.*, 1910, **14,** 325.) Ammonium nitrate in a state of fusion instantly dissolves certain metals, such as Cu, Zn, or Ni; while others such as Fe, Sn, and Sb, are absolutely unattacked. Alloys or mixtures of these metals may therefore be rapidly and quantitatively separated by the following simple expedient. A few Gm. of $AmNO_3$ are fused in a porcelain crucible; from 2 to 4 Gm. of the alloy are then added to the melted salt, and the mixture is heated until the action has ceased, which will be in a few minutes. On treating the melt with water the Fe and other metals unattacked may be collected and weighed directly, when dry.

Arsenic not appreciably Volatile in putrefying Organic Matter. M. Tonegotti. (*Bull. Chim. Pharm.*, 1909 [10]. *Schweiz. Woch.*, 1910, **48,** 303.) Arsenic produces no volatile gaseous compounds in the presence of active putrefaction of animal matter. Only a very minute trace combines with the volatile ptomaines generated, and these are not volatile below 30°C.; and are probably given off between 50 and 60°C. Consequently

there would appear to be no material loss of arsenic under these conditions.

Arsenite, Detection of, in Presence of Arsenate. E. Covelli. (*Gaz. Chem. Ital.*, **1909**, 173; *Répertoire*, 1909, **21**, 505.) Five c.c. of the solution of the salt is treated with a large excess of solid KOH; a fragment of granulated zinc and a particle of pure iron wire are added, the two pieces of metal being in contact. If the arsenate is free from arsenite, pure hydrogen is slowly evolved, and the gas does not darken ammoniacal silver nitrate paper. In presence of a trace of arsenite, AsH_3 is formed, which gives the familiar reaction.

Arsenium Aniline Tartrate. P. Yvon. (*J. Pharm. Chim.*, 1910, **1**, 473.) A compound analogous to the "emetic" series of salts containing the monatomic arsenyl group (AsO)′, instead of the antimonyl molecule (SbO)′, and substituting aniline for the alkali radicle, is prepared as follows. Tartaric acid, 150 Gm., is dissolved in warm water 350 Gm.; aniline, 93 Gm., is added, and when combined, arsenious acid, 99 Gm., is added and the mixture boiled until complete solution is obtained, the loss by evaporation being made up by adding more water. On cooling and standing for 24 hours, no deposit of As_2O_3 should form. The liquid is then filtered, and evaporated on the water-bath to a syrup; which is dissolved in half its weight of water. On standing, voluminous crystals of $HC_4H_4O_6 \cdot AsO \cdot C_6H_7N$ are formed in hexahedra. These are really anhydrous, although they contain 5·55 per cent. of interstitially adherent moisture. When heated to 100°C. they lose 1 mol. H_2O and are converted into the corresponding anilide. The original salt is very soluble in water 1 : 2·39 at 15°C. and 1 : 0·136 at 100°C. The solutions are acid. It is also fairly soluble in alcohol.

Bismuth β-Naphtholate, Examination of. W. A. Puckner and W. S. Hilpert. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 859.) One or 2 Gm. of the sample is shaken in a separator with 25 c.c. of $CHCl_3$ and 25 c.c. HCl frequently, for an hour; 50 c.c. of water was then added, and the whole is again shaken up. After separation the $CHCl_3$ is filtered through a tared filter into a tared capsule and the acid liquid is again shaken out, three times in succession, with 10 c.c. of $CHCl_3$ each time, and these $CHCl_3$ washings are passed through the same filter. The bulked $CHCl_3$ is allowed to evaporate spontaneously, then

dried to constancy over H_2SO_4 and weighed as total β-naphthol. The acid liquid in the separator is then run through the same filter, the filter is washed first with acid water, then with water, then dried and weighed. The weight gives the amount of insoluble impurity. The acid filtrate is then heated to boiling, AmOH is added to produce turbidity, followed by sufficient HCl to again make it clear; a large excess of Am_2HPO_4 solution 10 per cent. is then added, and the precipitated $BiPO_4$ is washed, dried, and heated over the bunsen flame until constant, then weighed; the weight $\times 0{\cdot}68694$ gives the equivalent o, Bi. To determine the amount of uncombined β-naphtholf a weighed quantity, packed in a small tube, is percolated with Et_2O into a tared dish. After evaporating the solvent the residue is weighed as uncombined β-naphthol. The amount of Bi found in ten samples varied from 56·63 to 75·3 per cent.; the total naphthol varied from 6·89 to 22·02 per cent., and the free naphthol removed by ether from 0·33 to 4·46. One sample, treated direct by percolation with $CHCl_3$, gave 18·46 of a soluble organic compound, but only 0·33 per cent. of free naphthol soluble in Et_2O. It is evident, therefore, that bismuth β-naphtholate as met with in American commerce is far from uniform in constitution.

Bismuth Tribromocarbolate, Preparation of. C. Kollo. (*Pharm. Post*, 1910, 245; *Pharm. Zentralh.*, 1910, **51,** 409.) Tribromophenol is first prepared thus: Phenol, 10, is dissolved in water, 600; and bromine, 50, in water, 2,500 or 3,000. The latter solution is then added to the former with constant agitation. The white precipitate of tribromophenol is collected on a cloth filter, washed, dried, re-dissolved in alcohol and crystallized. One molecular weight of this, and 1 mol. of KOH, are dissolved together in ten times their weight of water. The solution is mixed, with thorough stirring, with a solution of 2 mols. $Bi3NO_3{\cdot}5H_2O$ in five times its weight of a mixture of equal parts of glycerin and water. The precipitated bismuth tribromocarbolate is then washed by decantation with distilled water at 80° to 90°C. until practically free from nitrate. It is then collected and dried on a porous plate.

Bismuth Tribromocarbolate Xeroform; Valuation of, and Determination of in Surgical Dressings. C. Kollo. (*Apoth. Zeit.*, 1910, **25,** 99.) *Xeroform.*—Two Gm. are suspended in 25 c.c. of distilled water, 10 c.c. of N/KOH solution are added,

and the mixture is warmed on the water-bath, with frequent agitation, until the Bi_2O_3 is completely precipitated. After cooling, the volume of liquid is adjusted to 100 c.c. Fifty c.c. of the clear liquid is then pipetted off, and titrated with N/HCl with phenolphthalein indicator. After deducting 5 c.c. for the equivalent of N/KOH present, each remaining c.c. of N/HCl used up is equivalent to 0·331 Gm. of tribromophenol. The precipitated Bi_2O_3 remaining in the flask is then collected on a tared filter, dried at 100°C., and weighed. The formula $Bi(C_6H_2Br_3O)_2OH, Bi_2O_3$, requires about 51 per cent. of bismuth oxide, and 47 per cent. of tribromophenol. *Xeroform gauze.*—Ten Gm. of the material are macerated for some hours, with occasional agitation, in a mixture of 99 parts of acetone and 1 part of 25 per cent. HNO_3. Fifty c.c. of the liquid are then pipetted off into a flask, and the solvent is driven off on the water-bath. The residue, which consists of tribromophenol and bismuth nitrate, is then treated as described above, with the exception that the product of reaction is the hydrated oxide, BiO·OH, and not the trioxide, Bi_2O_3, and that the free HNO_3 present must be neutralized before adding the standard alkali. In the xeroform from gauze, the author has been unable to find more than 42 per cent. of tribromophenol, and 48 per cent. of Bi_2O_3.

Bismuth Tribromocarbolate, Xeroform; Determination of Bismuth in. O. Schlenk. (*Pharm. Zeit.*, 1909, **54,** 538.) From 1 to 2 Gm. of the compound are boiled with about 20 c.c. of 10 per cent. NaOH solution, with constant stirring, until the bismuth is entirely converted into oxide. The precipitate is then washed, on a filter, with hot dilute NaOH solution, until the filtrate contains no more tribromophenol. The precipitate is then washed with hot water, transferred to a crucible, and incinerated. The residue is moistened with dilute HNO_3, and again gently incinerated. Treated in this manner xeroform should yield about 50 per cent. of Bi_2O_3.

Borax. (*Evans' Analyt. Notes*, **1909,** 15.) In 46 consignments of borax tested, the only impurities of note were Pb and As, with occasionally faint traces of sulphate and chloride.

Arsenic occurred to the extent of four parts per million and below in 39 samples; five parts per million in 3 samples; six parts per million in 2 samples; eight parts per million in 2 samples.

Lead occurred in equivalents of ten parts per million and below in 43 samples; between 10 and 20 parts per million in 3 samples. (See also *Y.B.*, **1905**, 25; **1908, 34**.)

Boric Acid. (*Evans' Analyt. Notes*, **1909**, 16.) Of 120 samples examined, only one showed more than four parts of arsenic per million. Metals of the lead group were present in varying quantity in most consignments of the ordinary qualities in the following proportions. Less than ten parts per million in 79 samples; between eleven and twenty parts per million in 27 samples; between twenty-one and thirty parts per million in 8 samples; between thirty-one and forty parts per million in 3 samples; between sixty and seventy parts per million in 3 samples.

No sample gave a purity of less than 99 per cent. by Thomson's method of titration. (*Y.B.*, **1894**, 105.) (See also *Y.B.*, **1908**, 34.)

"Bush Salt," African, Composition of. W. Lenz. (*Apoth. Zeit.*, 1910, **25**, 401; *Berichte Pharm.*, 1910, 225.) The natives of the interior of Africa employ the ash of a mixture of the leaves of *Halopegia azurea*, *Cyrtosperma senegalense*, and of the Raphia palm. The crude product is brownish and crumbly, has a saline taste and an alkaline reaction. It contains the following percentages of salts: KCl 43·33; K_2SO_4 27·5; K_2CO_3 16·26; $NaCl$ 0·85; H_2O 8·72; insoluble matter 3·34. The high percentage of Cl and of K salts is noteworthy. For use as salt, this ash is mixed with capsicum or grains of paradise powder.

Cadmium, Determination of, in Zinc. I. Hole. (*Apoth. Zeit.*, 1910, **25**, 137; *Tidjskr. for Kemi*, **1910**, [2].) The weighed metal is dissolved in dilute H_2SO_4 and separated from any SiO_2. Excess of H_2SO_4 is then added and the liquid evaporated until it begins to fume. It is then diluted with water and, if necessary, filtered. The filtrate, which should be markedly acid, is then saturated while warm with H_2S. This and all the following manipulations should be done with warm solutions. The AmOH is very carefully added, drop by drop, from a pipette, with constant stirring until the Zn begins to be precipitated. The precipitate is quickly filtered out, washed, and transferred to a graduated flask. H_2SO_4 is then added until about 20 per cent. is present. The H_2S is driven off by boiling, and after cooling the volume of liquid is made up to the mark and filtered

through a dry filter. The metals of the H_2S group and the greater part of Zn is thus removed. The Cd and some Zn are in the filtrate. An aliquot part of this is diluted with water, heated almost to boiling, and saturated with H_2S. Sufficient acid must be present to prevent the formation of any precipitate. AmOH is then added, cautiously, as described above, until a drop shows a yellow colour. After adding one or two more drops of AmOH, H_2S is passed through the solution for a few minutes. The warm solution is then passed, as quickly as possible, through a tared Gooch crucible. The precipitate thereon is washed with warm H_2S solution containing a very little dilute HCl; then in succession with water, EtOH, CS_2, and again with EtOH. It is then dried at 105°C. for 30 minutes and weighed.

In order to ensure that the whole of the Cd has been precipitated, the warmed filtrate from the above should be treated with a little AmOH. It should show no yellow precipitate.

Calamine. (*Southalls' Report*, **1909, 28.**) Notwithstanding the frequent comments that have been made on the quality of commercial calamine, this seems still to be very impure. One sample reported on contained no Zn, and others but 4·05 and 13·46 per cent., calculated as ZnO. Four samples out of five contained large amounts of $BaSO_4$. Two contained Pb; in one this was $PbSO_4$, in the other the Pb was soluble in dilute acids. One sample, practically soluble in HCl, contained 4·33 per cent. of Na_2CO_3, and 9·69 per cent. of Na_2SO_4. This was apparently prepared by precipitation and insufficiently washed. (See also *Y.B.*, **1907,** 406.)

Copper in Distilled Water. (*Pharm. Zeit.*, 1909, **54,** 650.) Distilled water may contain a minute trace of Cu derived from the distilling plant, and yet not give indication thereof with H_2S or K_4FeCy_6 applied directly. The contamination may be readily detected by filtering 5 or 10 litres of the water through a plug of pure cotton, inserted in the throat of a funnel so that the water runs away only in drops. When all has percolated, this wool will give the usual reactions, darkening with H_2S solution, and giving the characteristic red tint with K_4FeCy_6, if Cu be present in the water. It is considered that the present tests of the Ph. G. IV for distilled water are not sufficiently stringent.

Copper, Rapid Method for determining in Horticultural Pre-

parations. H. Fonzes Diacon. (*Annales de Chim. Analyt.*, 1909, **14**, 379.) *Copper Sulphate.*—Five Gm. of the crushed crystals is dissolved in boiling distilled water in a 200 c.c. flask; 3 c.c. of pure H_2SO_4 is added, and the volume is made up to 200 c.c. Twenty c.c. of this is pipetted off (corresponding to 0·5 Gm. of the original sample), and treated with 0·5 Gm. of pure zinc dust. The mixture is warmed on the water-bath, when the precipitated metallic Cu forms a red spongy mass. In half an hour the liquid should be colourless, and the precipitation of the Cu complete. A small portion of the liquid, when tested with ammonia, should show no blue tint; if it does so, excess of H_2SO_4 is added to the ammoniacal liquid, which is returned to the rest, and the heating is continued. When reaction is completed, the absence of any undissolved zinc is ensured by crushing the aggregated copper with a rod, and, if necessary, adding a little more H_2SO_4. When all evolution of H has ceased the Cu is collected, washed free from sulphate with boiling water, then transferred to a tared capsule, calcined, and weighed as CuO. *Bouillie bordelaise or other copper washes.*—Five Gm. of the material is treated in a graduated 100 c.c. flask with 70 or 80 c.c. of boiling distilled water and 4 c.c. pure H_2SO_4. After cooling the volume is adjusted to 100 c.c., and the liquid is filtered. Twenty c.c., corresponding to 1 Gm. of the original sample, is then treated as above with 0·5 Gm. of zinc dust. The process is conducted as described under $CuSO_4$. *Copper dusting powders.*—In France, a powder consisting of a mixture of talc 9, and copper sulphate 1, is sold under the name of "steatite cuprique." This is tested by treating 10 Gm. with 150 c.c. of water and 4 c.c. of H_2SO_4 in a graduated 200 c.c. flask. The mixture is kept on the water-bath for three or four hours, then cooled and made up to 200 c.c. Of this 100 c.c. of the clear liquid is treated with 0·5 Gm. of zinc dust, and the process is completed as described above.

Copper Sulphate (and Copper Salts), Gravimetric Determination of. P. B. Dallimore. (*Pharm. J.*, 1909 [4], **29**, **271**.) Three Gm. of the salt are heated on the water-bath, with constant stirring, with an excess of hypophosphorous acid diluted with an equal volume of water. Previous solution of the copper sulphate in water is not needful. In a few minutes the metal is quantitatively precipitated. The clear liquid is decanted, the precipitate collected, washed first with water,

then with EtOH, and finally with Et_2O. After drying for a few moments in a current of air it is transferred to a tared porcelain crucible, ignited until constant in weight, and weighed as CuO.

Hydrogen Peroxide, New Test Paper for. R. Charitschkoff. (*Apoth. Zeit.*, 1910, **25**, 63.) Strips of paper are moistened in a benzin solution of cobalt naphthenate and dried. They then acquire a red colour, which is changed to dark olive green on contact with a solution of H_2O_2, even when very dilute. Ozone is without direct action on these papers.

Hydrogen Peroxide Solution, Proposed Official Tests for, in the Ph.G. V. (*Apoth. Zeit.*, 1910, **25**, 156.) The following tests are additional to those similar in the B.P. Codex. Five c.c. of hydrogen peroxide solution should not be affected in 10 minutes by the addition of dilute H_2SO_4 (absence of Ba). It should give no precipitate after the addition of a few drops of $NaC_2H_3O_2$ and $CaCl_2$ solutions (absence of oxalic acid). Fifty c.c. of hydrogen peroxide solution should require for neutralization not more than 2·5 c.c. of N/10 NaOH solution (limit of free acid). Twenty c.c. when evaporated should give at the most not more than 0·02 Gm. of residue. The quantitative valuation is directed to be performed by the indirect iodometric method of the amount of I liberated from KI.

Lime, Detection of, in $CaCO_3$. (*L'Union pharm.*, 1910, **51**, 7.) In a graduated 500 c.c. stoppered flask, 2·5 Gm. of the $CaCO_3$ is shaken up from time to time with 125 c.c. and 125 c.c. of 2 : 100 solution of AmCl. The volume is then adjusted to 500 c.c. and the whole is well mixed. After allowing to stand an aliquot part of the perfectly clear liquid is pipetted off, and titrated in the usual manner with N/10 acid. The amount of AmOH found is equivalent to the CaO present.

Mercuric Chloride, Direct Determination of, in Solutions, and Tablets, by Means of KCN. E. Rupp. (*Apoth. Zeit.*, 1909, **24**, 939.) $HgCl_2$ may be titrated directly with KCN solution in presence of phenolphthalein, since $Hg(CN)_2$ is neutral to that indicator and KCN is alkaline. Consequently the moment the whole of the $HgCl_2$ has been converted into $Hg(CN)_2$ and free KCN is present, an alkaline reaction is evident. N/2 KCN solution is the best strength to use, and 5 to 10 drops of 1 : 100 phenolphthalein should be used. If the $HgCl_2$ solution be acid, it must first be rendered neutral with N/10 NaOH solu-

tion, only 1 drop of phenolphthalein indicator being used for this; more being added for the KCN titration. Each c.c. of the latter used up = 0·06772 Gm. of $HgCl_2$. In the case of tablets, five of 1 Gm. size or ten of 0·5 Gm. size are dissolved in a 250 c.c. flask in a little water, and then shaken with 0·1 or 0·2 Gm. of animal charcoal. The liquid is then made up to 250 c.c., filtered, and 50 c.c. titrated as above.

Mercuric Iodide, Determination of, in Ointments. P. Adam. (*J. Pharm. Chim.*, 1909, **30,** 300.) HgI cannot be easily separated from fatty preparations, on account of its solubility in most fat solvents. Petroleum ether is the best solvent for the purpose. From 2 to 3 Gm. of the ointment is treated, in the cold, with the smallest possible volume of petroleum ether. The solution of fat is decanted and residue is washed, on a tared filter, with several small portions of the solvent. It is then dried over H_2SO_4, in the cold, and weighed. The petroleum solution is then shaken with KI solution; after separating the aqueous liquid, the Hg is precipitated from this, in the usual manner, with H_2S. The mercury found weighed, as HgS, is added to that of the previous determination. If fraudulent admixture with chloride or ammonio chloride is suspected, the amount of iodine present must be determined.

Nessler's Reagent. A. Schneider. (*Pharm. Zentralh.*, **50,** 546.) Dissolve KI, 2 Gm., in distilled water, 5 c.c., and add to it in small quantities at a time, HgI_2 until no more will dissolve; about 3·2 Gm. will be required. Then add distilled water, 20 c.c., and a solution of pure KOH, 13·4 Gm. in water, 26·6 c.c. Allow the mixture to stand, and filter through asbestos.

Nitrates, Detection of Small Amounts of, in Presence of Bromides.—Villedieu. (*J. Pharm. Chim.*, 1909, **30,** 66.) The solution, rendered neutral if necessary, is treated with excess of basic lead acetate solution, in the cold, and allowed to subside. The supernatant liquid is decanted, filtered, and boiled; Na_2SO_4 is then added in small quantities at a time, to precipitate the Pb. After filtration, the clear filtrate is tested for nitrate with $FeSO_4$ and H_2SO_4, thus: To 1 c.c. of the filtrate an equal volume of H_2SO_4 is added and the mixture is cooled. A little pure $FeSO_4$ is finely powdered and treated with sufficient H_2SO_4 to give a purely turbid liquid. The acid liquid to be tested is floated on this. In the presence of nitric acid the characteristic

violet ring will be obtained at the zone of contact. The presence of 1 of KNO_3 in 100 of KBr is thus easily detected.

Nitrogen, Determination of, in Nitrates and Nitrites.—Salle. (*Annales Chim. analyt.*, 1910, **15,** 103.) In a 600–700 c.c. flask, 0·5 Gm. of the salt to be examined, 200 c.c. of distilled water, 5 Gm. of Zn dust, 1 to 2 Gm. of $FeSO_4$, and 50 c.c. of NaOH solution, sp. gr. 1·334, are mixed. A small piece of metal gauze and a plug of glass wool are then fixed in the neck of the flask to prevent any alkaline spray from being carried over during distillation. The flask is then connected up with a condenser, and the contents sharply boiled. The ammoniacal distillate is received in a vessel containing a known volume of standard acid. The whole of the AmOH will have distilled over in 35 minutes. The excess of acid remaining in the receiver is then titrated in the usual manner. Aluminium is less suitable than zinc as the reducing agent; since it causes the formation of a troublesome froth necessitating the conduction of the operation in two stages, reduction first, and subsequent distillation. Reduction by either Zn or Al alone, without $FeSO_4$, is incomplete, and when Fe salts alone are used low results are also obtained. The above method is of general application. Alkali phosphates do not interfere; so that the process is admirably adapted to the determination of the nitric N in manures.

Potassium Hydroxide Sticks, Commercial, Presence of Paraffin in. F. Bengen. (*Apoth. Zeit.*, 1910, **25,** 201.) As much as 0·544 Gm. of a thick fluid paraffin has been isolated from 1 kilo of commercial sticks of KOH. This impurity occurs on the surface of the sticks, and is either added to hinder deliquescence, or is used as a lubricant for the moulds into which the fused alkali is poured. It is pointed out that the presence of this impurity would preclude the use of such KOH from such tests as the determination of unsaponifiable matter in fats, and other quantitative experiments.

Potassium Iodide, Absence of Iodate from. L. W. Andrews. (*J. Amer. Chem. Soc.*, 1909, **31,** 1055.) The conclusion that the reaction afforded by HCl with KI and starch indicator is due to traces of KIO_3, is erroneous. That salt rarely occurs as an impurity in commercial KI. The reaction obtained is due to the presence of minute traces of Fe or Cu. The only reliable test for KIO_3 is that of the B.P. which employs $H_2C_4H_4O_6$ to liberate I from any KIO_3 present.

Silver Caseinate, Argonine. G. Mossler. (*Zeitschr. d. allgem. oesterr. Apoth. Verein.*, 1910, 130.) Silver caseinate, chemically identical with argonine, is obtained by mixing equivalent quantities of solutions of sodium caseinate and $AgNO_3$, and precipitating the silver compound by adding EtOH. It forms a greyish white odourless powder, soluble in water up to 10 per cent., the solution having a weak alkaline reaction and an opalescent appearance; it dissolves in alkaline liquids and in solutions of albumin. The aqueous solution is not precipitated by NaCl, but on adding HNO_3 AgCl is precipitated.

Silver, Determination of Influence of the Amount of Iron Alum Indicator in the Volhard Method. E. Mannheim. (*Apoth. Zeit.*, 1910, **25,** 200.) It has been suggested to determine the amount of Ag in the official preparations of the new *Ph. G.* which contain that metal by means of Volhard's method with N/10 AmCNS solution, using "*a few drops* of iron alum solution as indicator." The author shows that these instructions are erroneous. If only a few drops of the indicator are added, the results obtained will be much too high. The official directions should require the addition of 10 c.c. of iron alum indicator previous to the titration. This indicator may be either a 1 : 10 solution of iron alum, or a solution of HNO_3 1, iron alum 1, in water, 8.

Silver Nitrate, Official Test of the French Codex 1908, for Bi, Pb, and Cu in. H. Ribaut. (*Bull. Sci. Pharm.*, 1910, **17,** 143.) The official test states that after precipitating an aqueous solution of the salt with dilute HCl, the clear supernatant liquid should give no colouration with H_2S. But, as pointed out by Glucksmann, such an absence of reaction cannot be obtained under these conditions, for freshly precipitated AgCl is not absolutely insoluble in dilute HCl. The test should direct the mixture of HCl and $AgNO_3$ to be evaporated to dryness on the water-bath. The dry residue should then be treated with distilled water. A portion evaporated to dryness should leave no residue of alkali nitrates. The other portion should give no colour when treated with AmOH and H_2S.

Sodium, New Method for the Detection of. W. C. Ball. (*Proc. Chem. Soc.*, 1909, **25,** 284.) A solution of potassium bismuth nitrite, to which about 1 per cent. of cæsium nitrate has been added, produces a yellow crystalline precipitate of

$9CsNO_2,6NaNO_2,5Bi(NO_2)_3$, with traces of a Na salt. One part of Na in presence of several thousands of potassium may thus be detected. Conversely, a solution of sodium bismuth nitrite is an excellent test for caesium, and also for rubidium, if in not too great dilution.

Sodium Arsenate, Iodometric Determination of. E. Lukanow. (*Apoth. Zeit.*, 1910, **26**, 122.) Ten c.c. of the official *Ph. G. IV* solution of sodium arsenate is treated in a stoppered flask with 3 Gm. of KI and 20 Gm. of strong HCl. After 10 to 15 minutes' contact, not longer, any sublimed I is washed down from the neck of the flask and the liberated I is titrated, in the usual manner, with N/10 thiosulphate. Each 2 mols. of I are equivalent to 1 mol. H_3AsO_4.

Sodium Cacodylate, Varying Degree of Hydration of Commercial. P. Lemaire. (*Rep. Pharm.*, 1909, **21**, 250.) Although only the anhydrous form of sodium cacodylate, containing 46·87 per cent. of arsenic, is official in the French Codex, 1908, the commercial salt contains two or more molecules of water of crystallization. Specimens recently examined have yielded only from 34·2 to 37·95 per cent. of arsenic. The anhydrous salt has not been met with in French commerce.

Sodium Sulphite, Anhydrous, for Official Recognition. E. Elvove. (*Amer. J. Pharm.*, 1910, **82**, 211.) The official salt in the U.S.P. (and the B.P.) $Na_2SO_3,7H_2O$, is found to be extremely unstable, quickly losing a notable proportion of its available SO_2 and being oxidized into Na_2SO_4. The anhydrous salt has not this disadvantage, and is found to be practically permanent under ordinary conditions. It should, therefore, replace the hydrated form in the official work. The anhydrous salt would also be a more convenient source of SO_2, and the preparation of the solution of that gas could be then more conveniently performed than by the method now official of reducing H_2SO_4 with charcoal. The H_2SO_3 solution could then easily be made to contain 14·5 per cent. of SO_2, instead of 6 per cent., as now required. This strong solution of SO_2 could then be used to prepare the $NaHSO_3$ reagent direct, by dissolving in it the equivalent amount of anhydrous Na_2SO_3. This would render unnecessary the inclusion of salt $NaHSO_3$, which is also most unstable.

Sulphurous Acid, Nature of Deposit in. E. J. Brown.

(*Pharm. J.*, 1910, **30**, 244.) The deposit, in small white acicular crystals, proved to be a mixture of $CaSO_3$ and $CaSO_4$.

Tartarated Antimony. (*Southall's Report*, **1909**, 28.) Difficulty has been experienced in obtaining this free from As. Forty per cent. of the samples examined have contained more than 40 parts of As per million.

Zinc, Cobalt and Nickel, New Reagent for. E. P. Alvarez. (*Annales Chim. analyt.*, 1910, **15**, 129.) Cobaltous sulphate, or chloride, 1, is dissolved in aqueous solution of SO_2, saturated at 0°C, 10; then pure KCy solution is added until the red precipitate at first formed is redissolved. The reagent thus obtained is a solution of K_4CoCy_6 in SO_2 solution. When added to a solution of $ZnSO_4$, it gives deep orange red coloured precipitate of Zn_2CoCy_6, which is insoluble in SO_2 solution but soluble in excess of the above reagent, forming therewith a deep red liquid containing $K_2ZnCoCy_6$. The precipitate, Zn_2CoCy_6, when collected and dried in the air has an orange colour. When heated it becomes dehydrated, and turns violet. It reassumes its orange shade when treated with a trace of water. The above is one of the rare reactions with Zn salts in which a coloured precipitate is obtainable of analytical value. The reaction may be used to detect Zn in presence of certain other metals, such as Al. Ni salts under similar conditions give a yellow precipitate of Ni_2CoCy_6, turning green when anhydrous; this, with excess of the reagent, gives a yellow solution containing $K_2NiCoCy_6$. This solution is readily decolourized by strong solution of $H_2C_4H_4O_6$. Co salts give a red precipitate of Co_2CoCy_6 which affords a red solution of $K_2CoCoCy_6$ with excess of the reagent. This deep red solution, unlike that of Ni, is not easily decolourized by $H_2C_4H_4O_6$ solution.

Zinc, Gravimetric Determination of, as Sulphate. E. C. Sullivan and W. C. Taylor. (*Ind. and Engin. Chem.*, **1**, 476; *Annales de Chim. analyt.*, 1910, **15**, 193.) The zinc is precipitated as sulphide from a warm solution very faintly acid with HCl or H_2SO_4, and treated with ammonia until only barely acid. The precipitate is washed with hot water, transferred to a tall beaker with a little water; the filter being washed free from traces of ZnS with HCl. The liquid is then evaporated to dryness, care being taken against loss by spurting, until all the H_2S is driven off. H_2SO_4 is then added; when solution is complete, the liquid is transferred to a tared porcelain crucible

and evaporated to dryness on the water-bath. The excess of H_2SO_4 is driven off in an air bath, and the residue is finally heated cautiously for a few minutes to redness; it is then cooled in a desiccator and weighed as $ZnSO_4$. Small amounts of AmCl do not affect the results, large quantities occasion loss.

Zinc Oxide, Impurity of. (*Southall's Report*, **1909,** 31.) The lower grades of this contain large quantities of Pb and As and are unfit for pharmaceutical use.

Zinc Peroxide, Commercial Valuation of. P. Lemaire. (*Répert. Pharm.*, 1910, **22,** 1.) Although the author has not found the quality of commercial ZnO_2 to be so low as Vanverts met with in 1905, when some of the samples examined were nothing but ordinary ZnO and yielded no "available" oxygen; the quality of the article still leaves much to be desired. Of 15 specimens examined the best contained but 40.98 per cent. of ZnO_2, and the worst only 11.15 per cent. The peroxide is examined thus. Twenty Cgm. is dissolved in 10 c.c. of 1 : 10 H_2SO_4; then titrated in the usual manner, to a permanent pink tint, with N/10 $KMnO_4$, each c.c. of which used up = 0.0008 of O from ZnO_2, or, with the above quantity of 20 Cgm. taken, 2·425 per cent. of ZnO_2 in the sample.

ORGANIC CHEMISTRY: UNCLASSIFIED

Acetic Ether, Impurities in Commercial. J. Habermann and H. Brezina. (*Pharm. Zeit.*, 1909, **54**, 879.) Published statements as to the b.p. of acetic ether vary. This is due to the fact that the commercial article is impure. Guenther has given the b.p. of "acetic ether" as 72–78°C. Other workers give 77·1 to 77.5°. According to the authors, the lower b.p. is due to a fraction in the commercial article boiling at 70–72°C. Although this is not homogeneous, it is mainly composed of a combination of ethyl acetate and ethyl alcohol in equimolecular proportions. Pure $C_2H_5C_2H_3O_2$ boils at 76–77°C. They find that if anhydrous $CuSO_4$ be substituted for H_2SO_4 in a mixture of glacial $HC_2H_3O_2$ and C_2H_5OH, and the mixture be allowed to stand, with frequent agitation, at the normal temperature for 24 hours, combination takes place. But on fractionating the reaction product a considerable portion passes over at 70–72°C. This is the compound alluded to above. In general characters it agrees with Guenther's "acetate ether." It occurs in varying proportions in the acetic ether of trade.

Acrolein, Method of Preparing. G. F. Bergh. (*J. Pharm. Chim.*, 1909, **30,** 110.) Strong H_3PO_4, sp. gr. 1·75, is the best dehydrating agent for the preparation of acreolin from glycerin. A mixture of H_3PO_4, 1; and glycerin, 4; yields acreolin on distilling 215°C. The distillate is then rectified by water-bath distillation.

Alpha- and Beta-amyrin. N. H. Cohen. (*Rec. trav. chim. Pays Bas*, **28,** 391; *Chem. Zentralbl.*, 1910, **1,** 654.) α-Amyrin $C_{30}H_{50}O$, forms needles, m.p. 186°C. corr.; $[\alpha]_D + 82°8'$. β-Amyrin, having the same formula, occurs in hard needles and melts at 197–197·5 corr.; $[\alpha]_D + 88°43'$. The esters of both these amyrins are fully described. (See also *Y.B.*, **1888,** 57; **1890,** 41; **1900,** 155; **1904,** 67, 77; **1905,** 71; **1909,** 43.)

Amyl Acetate. (*Evans' Analyt. Notes*, **1909,** 8.) Great variation is noted in the composition of the commercial article. The ordinary variety, used for flavouring, has the sp. gr. 0·860 to 0·869, and an apparent purity of 80 to 90 per cent. It is prepared from a fousel oil containing the lighter fractions, freed by rectification from substances of higher boiling points than amyl alcohol. The presence of the lighter fractions is an advantage, enhancing the aroma of the product. Another variety, prepared solely from the lowest boiling fractions of fousel oil, distilling below 100°C., has the sp. gr. 0·843 to 0·848. This has an apparent purity of 50 to 55 per cent. of amyl acetate, and is used for technical purposes. Pure amyl acetate, prepared by acetylizing the fraction of fousel oil boiling at 129–130°C. has the sp. gr. 0·877 and assays at about 99 per cent. of amyl acetate. Another commercial variety, prepared from unrectified fousel oil, has the sp. gr. 0·879, and an apparent purity of over 100 per cent. This is inferior in flavour to the first-named product, owing to the presence of higher boiling impurities.

Amyl Alcohol, Detection of, in Alcoholic Beverages. H. Hollaender. (*Muench. Med. Woch.*, 1910, 83; *Pharm. Zentralh.*, 1910, **51,** 343.) Twenty-five c.c. of the liquid is treated with 1 c.c. of N/KOH, and the whole is distilled. Five c.c. of the distillate is mixed with an equal volume of strong acetic acid, the mixture heated to boiling for about a minute. A drop of pure phenylhydrazine is then added, and the solution is cooled down to the normal temperature. The cool liquid is then floated on strong HCl. In presence of amyl alcohol a

distinct green ring will appear at the contact zone. A brown colour above this may be disregarded.

Apiol. *Evans' Analyt. Notes*, **1909**, 11.) A specimen of green French apiol contained 40 per cent. of essential oil, having the sp. gr. 1·137; a_D $-0°20'$; soluble 1 : 5 in alcohol 80 per cent. This apiol was probably prepared by extracting the parsley fruits with a volatile solvent.

Ash and Moisture of Certain Drugs. W. Peters. (*Apoth. Zeit.*, **24**, 537.) The following figures indicate the percentage of moisture determined at 100°C. and of the ash of the drug *dried at that temperature.* From these data the author has calculated the ash of the "air dried" drug. These figures are not reproduced, as they may be obtained from the data given. *Squill bulb*, whole; moisture, 12·33; ash, 3·14: coarse powder, moisture, 8·55; ash, 3·89. *Cantharides*, whole; ash, 6·37: fine powder, moisture, 8·27; ash, 7·53: coarse powder, moisture, 6·59; ash, 7·19. *Cinchona succirubra bark*, coarse powder; moisture, 8·09; ash, 10·87: fine powder, 6·74 to 7·03; ash, 2·97 to 5·94. *Pomegranate bark*, fine powder; moisture, 6·51; ash, 13·32. *Artemisia maritima flowers*, "*Flor. Cinae*," coarse powder; moisture, 6·0; ash, 11·03: fine powder, moisture, 5·62; ash, 12·44. *Belladonna leaves*, whole; moisture, 7·14; ash, 6·75 to 14·83. *Coca leaves*, whole; ash, 7·18 to 8·11. *Digitalis leaves*, whole; ash, 10·56: coarse powder; moisture, 9·08; ash, 9·74: fine powder, moisture, 6·87 to 8·49; ash, 7·67 to 11·6. *Hyoscyamus leaves*, whole; ash, 19·37 to 24·89. *Jaborandi leaves*, whole; ash, 8·76 to 10·87. *Stramonium leaves*, whole; ash, 15·58 to 22·36: coarse powder, moisture, 7·15; ash, 19·88: fine powder; moisture, 6·83; ash, 23·32. *Linseed meal*, coarse; moisture, 8·32; ash, 7·63. *Angelica root*, coarse powder; moisture, 7·75; ash, 14·67. *Gentian root*, coarse powder; moisture, 8·15; ash, 3·81: fine powder, moisture, 8·18; ash, 4·81. *Ipecacuanha*, fine powder; moisture, 7·54; ash, 4·81. *Lovage root*, whole; ash, 9·07: coarse powder; moisture, 8·93; ash, 15·46: fine powder, moisture, 9·24; ash, 15·33. *Licorice root*, fine powder; moisture, 8·19; ash, 5·81. *Pimpinella root*, whole; ash, 10·28: coarse powder, moisture, 8·8; ash, 12·08. *Valerian*, coarse powder; moisture, 7·35; ash, 30·8. *Rhubarb*, fine powder; moisture, 6·5; ash, 6·7. *Nux Vomica*, fine powder; moisture, 9·99; ash, 2·04. *Tragacanth*, fine powder, moisture, 13·7 to 14·98; ash, 2·8 to 3·85. [In comparing

these figures with those already published, it should be borne in mind that many of the latter refer solely to the "air dried" drug, which lessens their value for absolute comparison.—ED. *Y.B.*). (See also references in *General Index*, **1885–1903, 50–54**; and *Y.B.*, **1904,** 203, 206; **1905,** 118; **1908,** 169.)

Baked Flour, Colour Reaction with Fe_2Cl_6, simulating that of Salicylic Acid. A. Backe. (*Comptes rend.*, 1910, **150,** 540.) Baked flour, biscuit powder, and bread crust all give a reddish violet colour with Fe_2Cl_6 solution which, although different from the characteristic violet tint produced with salicylic acid, is sufficiently like it to have caused a proprietary baked flour preparation to be rejected as containing added salicylate preservative. The nature of the decomposition product of flour giving the reaction is being investigated.

Cannabinol, Further Investigation of. M. Czerkis. (*Apoth. Zeit.*, **24,** 1880.) Cannabinol, $C_{21}H_{30}O_2$, contains one OH group; and since on nitrating it yields trinitro-cannabinol, probably three C_6H_6 nuclei are present. By the energetic action of HNO_3 the substance $C_{21}H_{29}N_3O_{12}$ is obtained. On further oxidation, butyric and oxalic acids result. By oxidation with $KMnO_4$ a solid body having the probable formula $C_{18}H_{24}O_3$ is obtained. Pure cannabinol in solution in acetic acid slowly becomes green in the cold, and quickly on warming; ultimately the colour is red. On adding KOH to an alcoholic solution, a deep red colour is given, which disappears on acidifying. The cannabinol value of the hemp drugs is best determined by physiological experiments on cats or dogs, not on herbivorous animals, employing about 1 Gm. of the petroleum ether extract.

Cascara Sagrada Fluid Extract, Volatile Substance from. F. H. Alcock. (*Pharm. J.*, 1909, **29,** 666.) On distilling liquid extract of cascara, a small amount of a yellow substance passes over. This is soluble in ether, and the ether residue gives a crimson colour reaction with ammonia. The general reactions suggest the presence of emodin.

Charcoal, Wood. (*Southalls' Report*, **1909,** 9.) Nine out of 17 samples examined exceeded the official requirements for not more than 7·5 per cent. of ash. The figures obtained ranged from 2·6 to 17·1 per cent. (See also *Y.B.*, **1908, 43.**)

Chemicals and Drugs in the New Ph.G., V., Suggested Characters

and Tests for. In the following notes, where the preparation occurs in the B.P. Codex, only those characters and tests are given which differ from those in that work.

Acetyl salicylic acid. (*Pharm. Zentralh.*, 1910, **51**, 189.) Soluble in water 1 : 300. M.p., 135°C. The liberated salicylic acid should melt at 157°C.

Argentum colloidale. (*Pharm. Zentralh.*, 1910, **51**, 189.) Should contain at least 70 per cent. of Ag. Greenish or bluish black scales with metallic lustre. The 1 : 50 solution is opaque and appears cloudy by reflected light. It is transparent, when freely diluted with water, by transmitted light, but still opalescent by reflection. Its solutions are precipitated on addition of mineral acids, but not with dilute NaCl solution ; but on adding NaCl to saturation the precipitate formed redissolves on dilution with water. When 0·1 Gm. is incinerated it gives the odour of burnt animal matter ; the residue dissolved in HNO_3 and diluted to about 100 c.c. should require at least 6·5 c.c. of N/10 AmCNS solution to give a red colour with iron alum indicator. (See p. 137).

Argentum proteinicum. (*Pharm. Zentralh.*, 1910, **51**, 190.) Should contain at least 8 per cent. of silver. A fine brownish yellow powder, readily soluble in water. The 2 per cent. aqueous solution gives a violet colour when 5 c.c. is treated with 5 c.c. of NaOH solution, 10 c.c. of water, and 2 c.c. of a 2 per cent. $CuSO_4$ solution. The 2 per cent. aqueous solution imparts a faint blue colour to litmus paper. It should not precipitate with NaCl solution, nor be darkened by AmHS. If 1 Gm. of the original powder be shaken with EtOH and filtered, the filtrate should give no precipitate with HCl. When incinerated, 1 Gm. of the dry powder should require at least 7·4 c.c. of N/10 AmCNS solution when treated as described under *Argentum colloidale.*

Benzoylethyldimethylaminopropanol hydrochloride. (*Pharm. Zentralh.*, 1910, **51**, 190.) (Stovaine.) A white, crystalline powder, soluble 1 : 2 in water. The solution reddens blue litmus; readily soluble in EtOH 90 per cent. ; almost insoluble in Et_2O. M.p., 175°C.

Cresolum crudum. (*Pharm. Zentralh.*, 1910, **51**, 204.) Should contain at least 56 per cent. of meta-cresol. If 50 Gm. be distilled from a 70 c.c. flask, at least 46 Gm. should come over at about 200°C. If 10 c.c. be shaken in a 200 c.c. graduated cylinder with 50 c.c. of NaOH solution and 50 c.c. of water, only a few flocks of insoluble matter (naphthalin) should separate in 30

minutes. On then adding 30 c.c. of HCl and 10 Gm. of NaCl, an oily layer measuring not less than 9 c.c. should separate. If 10 Gm. of the cresol is heated in a litre flask for one hour on the water-bath with 30 Gm. of H_2SO_4, and when cooled to normal temperature be treated with 90 c.c. of HNO_3; when violent reaction has ceased and solution is effected, the mixture is allowed to stand for 15 minutes, and is then poured into 40 c.c. of water in a porcelain dish, the flask being washed out with another 40 c.c. of water. After two hours standing, the crystalline mass is broken up and transferred to a tared suction filter by means of another 100 c.c. of water. After drying for two hours it is weighed. The weight should not be less than 10 Gm. of trinitro-meta-cresol, which should melt at 105°C.

Formaldehyd solutus. (*Pharm. Zentralh.*, 1910, **51,** 206.) Should contain 35 per cent. of formaldehyde. If 3 Gm. of the formaldehyde solution be mixed with 50 c.c. of a freshly prepared solution of Na_2SO_3, 25 per cent., and 1 drop of phenolphthalein indicator; the mixture should require at least 37·8 c.c. of N/HCl to discharge the colour, after deducting the acidity found for 12 c.c. of the Na_2SO_3 solution with the same N/HCl solution and indicator. One c.c. of N/HCl = 0·03002 Gm. formaldehyde.

Oleum arachidis. (*Pharm. Zentralh.*, 1910, **51,** 208.) Pale yellow, odourless, bland; sp. gr. 0·916 to 921°C.; iodine value, 83 to 100; saponification value, 188 to 196·6. If 5 c.c. be shaken with 0·1 c.c. of alcoholic furfural solution and 10 c.c. of HCl for at least half a minute, the water layer which separates on standing should show no red colour (absence of sesame oil). If 5 c.c. be heated under a reflux tube with 5 c.c. of amyl alcohol and 5 c.c. of 1 per cent. solution of S in CS_2 for 15 minutes on the water-bath, and if then another 5 c.c. of the S solution be added, and the mixture be again heated as before, no red colour should be developed (absence of cotton-seed oil).

Para-aminobenzoyldiethylaminoethanol hydrochloride. (*Pharm. Zentralh.*, 1910, **51,** 209.) (Novocaine.) Colourless and odourless crystals; m.p., 156°C. Soluble in water 1 : 1; in EtOH 90 per cent., 1 : 30. From a 1 : 10 solution KOH precipitates a colourless oil, soon crystallizing. A mixture of equal parts of the salt with HgCl blackens when moistened with EtOH. If a solution of 0·1 Gm. of novocaine hydrochloride in 5 c.c. of water and 2 drops of HCl be treated with 2 drops of $NaNO_2$ solution; and this mixture be poured into a solution of 0·2 Gm.

of β-naphthol in 1 c.c. of NaOH solution and 9 c.c. of water, a scarlet precipitate is formed. If a similar solution of the salt and 3 drops of dilute H_2SO_4 be treated with 5 drops of $KMnO_4$ solution, the violet colour should be at once discharged (distinction from cocaine). 0·1 Gm. should dissolve colourless in 1 c.c. of HNO_3 (absence of foreign organic matter). The 1 : 9 aqueous solution should give no reaction with H_2S. The salt when burned should not leave more than 0·1 per cent. of ash.

Pyramolonum dimethylaminophenyldimethylicum. (Pyramidon.) Small colourless crystals very soluble in EtOH; less so in Et_2O and 1 : 20 in water. The aqueous solution is faintly alkaline to litmus. M.p. 108°C. The 1 : 20 solution, faintly acidified with HCl, is coloured violet with Fe_2Cl_6. The aqueous solution alone gives a violet colour with $AgNO_3$ reagent and on standing deposits metallic Ag. When treated with H_2S it should not be affected, and when made markedly acid with H_2SO_4 should give no precipitate with $AgNO_3$. If 0·02 Gm. be dissolved in 5 c.c. of water, or adding 2 drops of H_2SO_4 and 2 drops of $NaNO_2$ solution the liquid should remain colourless after the bluish violet colour has disappeared.

Trimethylbenzoxypiperidinum hydrochloricum. (*Pharm. Zentralh.*, 1910, **51**, 210.) (Eucaine hydrochloride: Betacaine hydrochloride, B.P. Codex.) If 1 drop of the 1 : 100 solution be treated with 1 drop of $HgCl_2$ solution no precipitate should be formed (absence of cocaine).

Tropacocainum hydrochloricum. (*Pharm. Zentralh.*, 1910, **51**, 210.) Colourless crystals or a white crystalline powder. Very soluble in water. M.p., 271°C. with decomposition. A solution of 0·1 Gm. of the salt in 2 c.c. of water gives a milky turbidity on adding 3 c.c. of Na_2CO_3 solution, which entirely disappears on shaking out with Et_2O. On separating the Et_2O layer, and evaporating it on the water-bath, the colourless oily residue which is left crystallizes when stood over H_2SO_4 in a desiccator. These crystals melt at 49°C. On treating a solution of 0·1 Gm. of the salt in 1 c.c. of water and adding 2 drops of HNO_3, a white crystalline precipitate occurs on shaking. If 0·1 Gm. of the salt be dissolved in 5 c.c. of water, and acidified with 3 drops of dilute H_2SO_4, it should be coloured violet on adding 1 drop of $KMnO_4$ solution, and when protected from dust but exposed to the air this violet colour should persist almost undiminished for half an hour (absence of coca bases). On then adding 1 c.c. of $KMnO_4$ solution, acicular violet crystals soon form.

Tropacocaine, 0·1 Gm., should dissolve without colour in 1 c.c. of H_2SO_4. It should not leave more than 0·1 per cent. of ash when burned.

Chlorogenic Acid, Identity of Helianthic Acid with. K. Gorter. (*Archiv. Pharm.*, **247,** 436.) The acid of the seeds of *Helianthus annuus*, described as helianthic acid by Ludwig and Kromeyer, is shown to be chlorogenic acid.

. **Citric Acid, Pusch's Test for Purity of.** J. R. Hill. (*Pharm. J.*, 1910, **30,** 245.) The literature relative to the test is exhaustively reviewed and very fully transcribed. The claim of Pusch that the test affords a simple and ready means of detecting tartaric acid as an impurity in citric acid is confirmed. The original test is thus modified : 0·5 Gm. of the acid is treated, in a chemically clean $\frac{5}{8} \times 6$ inch test tube, with 5 c.c. H_2SO_4 and suspended in a boiling water-bath side by side with a control test with a similar quantity of pure citric acid. Pure acid dissolves with effervescence to a lemon yellow solution, showing an incipient brownish tint in 30 minutes, and a distinct brown shade in 1 hour. In the presence of tartaric acid a more or less intense blackish-brown shade is evident ; with 1 per cent., black ; reddish brown with 0·001 per cent., and distinctly distinguishable from the tint of the pure acid with 0·00001 per cent. Good results may also be obtained by direct heating for 30 to 60 seconds in the naked flame. The test also detects sugar, the admixture of with citric acid on heating, when applied as above, giving a cherry red colour with 1 per cent. and a distinct reaction with 0·0001 per cent. Pusch's test in the cold also serves to detect sugar in tartaric acid. On the pure acid H_2SO_4 has no reaction ; samples containing 0·5 per cent. of sugar being markedly coloured on standing for 6 hours, the control test being colourless.

Coffee, Chicory, and Coffee and Chicory "Essences," Analyses of. R. R. Tatlock and R. T. Thomson. (*J. S. C. I.*, 1910, **29,** 138.) *Determination of Caffeine in Coffee.*—Boil 6 Gm. of the coffee with 600 c.c. of water for 2 hours, under a reflux condenser, cool, filter off 500 c.c. of the solution (equal to 5 Gm. of the coffee), evaporate the filtrate to about 40 c.c. in bulk, cool, add 10 c.c. of normal NaOH or AmOH, and transfer

ANALYSIS OF COFFEE AND CHICORY. PER CENT. IN SAMPLES DRIED AT 100°C.

	Costa Rica (raw).	Costa Rica (roasted).	Costa Rica (roasted).	Mysore (raw).	Mysore (roasted).	East India (roasted).	Mocha (roasted).	Coffee freed from Caffeine.	Chicory.
Caffeine	1·22	1·20	1·38	1·18	1·25	1·46	1·19	0·08	none
Water extract	30·80	30·26	30·77	31·02	29·06	29·10	30·76	27·42	75·84
Ash soluble in water	3·06	2·96	3·21	3·01	5·15	3·32	3·14	3·30	1·95
Ash insoluble in water, less silica	0·77	0·88	0·98	0·93	0·96	0·97	0·85	1·01	2·01
Total mineral matter, less silica	3·83	3·84	4·19	3·94	4·11	4·29	3·99	4·31	3·96
Silica (chiefly sand)	trace	trace	trace	trace	trace	trace	trace	trace	4·77
Oil	14·26	12·48	12·96	11·90	12·01	12·90	14·04	13·12	2·73
Tannin	3·75	none	none	4·50	none	none	none	none	none
Specific gravity of 10 per cent. extract	—	1·0102	1·0099	—	1·0102	1·0101	1·0102	1·0101	1·0274
Copper reducing power (as dextrose)	—	·60	—	—	·62	—	—	—	21·19
Moisture originally present	8·24	5·50	2·20	10·87	6·68	3·10	5·74	1·22	4·80

to a separator, washing in with as little water as possible, which need not be more than 10 c.c. Now shake up with three successive quantities of $CHCl_3$, consisting of 40, 30, and 10 c.c. respectively, collect these together in a clean separator, and shake up first with 10 c.c. of normal NaOH, and then with 10 c.c. of water, in order to remove all traces of colouring matter, etc. Distil off the $CHCl_3$, dry at 100° C., and weigh the caffeine. If the caffeine is coloured it may be dissolved in a little dilute NaOH, and extracted again with $CHCl_3$, but if the process is carefully carried out this is not necessary.

Determination of water soluble extractive.—Boil 1 Gm. of the sample with 400 c.c. of water under a reflux condenser for one hour, collect the insoluble matter on a weighed filter, wash two or three times with boiling water, dry at 100°C., and weigh. Traces of oil contained in the coffee may be left in the flask in which the boiling is conducted, and if this is the case they may be dissolved in ether, evaporated, weighed, and added to the insoluble matter contained in the weighed filter. From this weight the amount of water soluble extract is found by difference.

In the table opposite the results of a large number of analyses of coffee and chicory are summarized. It will be noted that the water-soluble extract of coffee affords a fairly constant factor, which, taken in relation to the amount of caffeine present, affords useful data in the analysis of coffee extracts.

The average composition of the aqueous extract of genuine coffee is: Organic matter 87, and mineral matter 13 per cent. In chicory extract the organic matter amounts to 95 and the mineral matter to 5 per cent. Caramel, which is largely employed as a diluent of coffee essences, contains 97 per cent. of organic matter and 3 per cent. of ash.

The organic matter of pure coffee extract contains 4 per cent. of caffeine. The copper reducing power expressed in terms of dextrose is only 2 per cent., compared with 35 per cent. of chicory extract, and 50 per cent. of caramel.

In the table on p. 150 the figures relate to two different brands of coffee and chicory essence (Nos. 1 and 2), and one of a French essence of coffee (No. 3).

	Per cent. No. 1.	No. 2.	No. 3.
Caffeine	0·20	0·32	0·68
Crystallizable sugar	38·43	39·73	
Uncrystallizable sugar	12·91	10·05	40·05
Other organic matters	16·26	15·92	
Mineral matter (ash)	1·50	1·63	3·27
Water	30·70	32·35	56·00
	100·00	100·00	100·00
Dry water extract of coffee . . .	5·00	8·00	17·00
Equal to coffee (dry)	16·7	26·7	56·7
Dry water extract of chicory . . .	17·00	11·8	20·00
Equal to chicory (dry).	22·6	15·7	26·6

Cresol Soap Solutions, Valuation of. G. Warnecke. (*Apoth. Zeit.*, 1909, **24,** 650.) Twenty c.c. of the cresol soap is introduced into a tared 50 c.c. fractionating flask fitted with a thermometer, and distilled. The receiver is a graduated cylinder, standing in cold water. Distillation is continued until vapour appears in the flask and yellow drops begin to distil over. The process is then stopped, and the cold residue in the flask weighed. Distillation commences at 96–100°C.; the temperature then rises rapidly to 196–199°C., and lastly from 204 to 208°C. The receiver will contain an upper layer measuring about 3 c.c., at first turbid, consisting of the alcohol and water which pass over at the lower temperature; then a clear water white layer of 1 c.c. of meta-cresol, passing over between 100–196°; and finally, 9 c.c. of meta-cresol distilling between 199–208°C. The residue in the flask will consist of greenish brown soft soap, and weigh approximately 7 Gm. This is treated with 10 c.c. of H_3PO_4 and 10 to 20 c.c. of water; warmed to dissolve and decompose the soap and liberate the fatty acids. The warm liquid is transferred to a graduated cylinder and the oily layer allowed to separate. It should measure about 7 c.c. The acid aqueous layer should be almost clear. This aqueous layer should give not more than a trace of precipitate when filtered, acidified with HNO_3 and tested with $AgNO_3$ or $Ba2NO_3$. The iodine value of the oily portion may be determined after it has been heated to 210–220°C. Lysol, when treated in this manner, gave: Distillate between 95–105°C., 3 c.c.; 105 to 190°C., 1 c.c.; 140–197°C., 9 c.c. Weight of residue, 7 Gm.; volume of fatty

acids, 7 c.c.; iodine value of these, 163·3. The aqueous solution contained much HCl and a little H_2SO_4.

Cresol Soap Solutions, Valuation of. R. Rapp. (*Apoth. Zeit.*, 1909, **24**, 641.) Twenty c.c. of the solution is introduced into a tared distillation flask, fitted with a thermometer and attached to a Liebig's condenser. Forty c.c. of glycerin is added, and the mixture is carefully distilled into a graduated cylinder until 30 c.c. has distilled, the temperature not being allowed to rise above 280°C. The distillate is then mixed with an equal volume of H_2SO_4, 66 per cent., when the cresol rises to the surface, so that its volume may be read off. The residue in the flask, containing the soap, is treated with 100 c.c. of distilled water, 3 Gm. of hard paraffin, and 20 c.c. of N/H_2SO_4. The whole is warmed on the water-bath until the liberated fatty acids and the melted paraffin form a clear layer on the surface. The mixture is then cooled, and the liquid decanted through a piece of fine muslin placed over the mouth of the flask. The solid fats are washed twice with 30 to 50 c.c. of water, then dried over a small flame until frothing ceases. When cold, the residue is weighed. The weight of the added paraffin being deducted, the amount of fatty acids is found. If desired, this mixture may be treated in a graduated tube with 9 per cent. NaOH, which removes the saponifiable fats, and the volume of non-saponifiable matter may be read off. Also the saturating power of the fatty acids may be determined by titration with N/NaOH and phenolphthalein indicator.

Cubebin, Further Examination of. E. Mameli. (*J. Pharm. Chim.*, 1909, **30**, 220; *Gaz. Chim. ital.*, 1909, **1**, 477.) In 1887 Pomeranz, when acetylizing cubebin, noticed the simultaneous formation of a body which he regarded as the product of the elimination of a mol. H_2O from 2 mols. cubebin, thus:

$$2C_{10}H_{10}O_3 - H_2O = C_{20}H_{18}O_5$$

The author finds that this body is cubebin ether, and that it is formed by many dehydrating agents with cubebin. When recrystallized from warm dilute alcohol it forms fine colourless needles; m.p., 78°C.; $a_D + 23°4'$ in $CHCl_3$ solution. When treated by nascent H from Na and C_2H_5OH it forms the alcohol cubebinol, $C_{20}H_{20}O_5$, forming long colourless needles, m.p., 92°C.; $a_D + 34{\cdot}81°$ in $CHCl_3$ solution. Its acetic ester melts at 71°; the benzoate at 154–155°C. and the phenyl urethane at the same temperature.

Dithymol, Formation of, by H_2O_2.—Brissemoret and —Blanchetière. (*Bull. Soc. Chim.*, 1910, **7**, 235.) The authors find that when a mixture of alcoholic solution of thymol and H_2O_2 is exposed to sunlight, a yellow colour soon appears, the liquid becomes turbid in 24 hours, and after three weeks the action is complete. The greyish white precipitate formed is dithymol, $C_{20}H_{26}O_2$.

Etholides, Juniperic and Sabinic Acids, the Saponification Products of. J. Bougault and L. Bourdier. (*J. Pharm. Chim.*, 1909, **30**, 10) and J. Bougault (*ibid.*, 1910, **1**, 425.) Continuing the investigation of this interesting class of compounds previously described (*Y.B.*, **1909**, 35), the authors find that juniperic acid is met with as a saponification product of all the coniferous waxes hitherto investigated. Sabinic acid is, however, only met with in the wax of *Juniperus sabina*. It has not been found in the waxes of *Picea excelsa, Thuja occidentalis, Pinus sylvestris*, nor even in *Juniperus communis*. To separate the acids of savin wax, that substance was saponified with excess of alcoholic NaOH. The soap, after distilling off the solvent, was dissolved in boiling water, and the fatty acids precipitated by means of HCl. The mixed liberated acids were then treated with a slight excess of Na_2CO_3 solution, and the soap was salted out with NaCl and washed with NaCl solution. By this means the sodium salt of juniperic acid and of some other acids are precipitated, while sabinic acid is not salted out by the brine solution. The precipitated soap was collected, and decomposed again in aqueous solution with HCl. Juniperic acid was then isolated by fractional crystallization from benzine and Et_2O. Since it is less soluble in these solvents than the accompanying fatty acids, its separation is not difficult. Sabinic acid was obtained, almost pure, by acidifying the brine solutions, and purifying by crystallization from benzine. Juniperic acid melts at 95°C.; becoming dehydrated at that temperature it afterwards re-melts at 83°C. But if again boiled with alcoholic KOH and re-liberated it again melts at 95°C. When exposed on the water-bath, it loses weight equivalent to about 1 mol. H_2O. All its salts are insoluble in cold water and in alkaline solutions. Sabinic, acid, m.p. 84°C., affords salts which are generally much more soluble than the above. Subsequent investigation by Bougault shows that *sabinic acid* is 12-oxylauric acid, and *juniperic acid* 16-oxypalmitic acid.

Incidentally, the *thapsic acid* discovered in *Thapsia garganica* root in 1885 by Canzoneri (*Y.B.*, **1895**, 156) is tetradecamethylene-dicarbonic acid. The connexion between these acids is evident when their formulae are compared: Sabinic acid, $CH_2OH \cdot (CH_2)_{10}COOH$; palmitic acid, $CH_3 \cdot (CH_2)_{14}COOH$; juniperic acid, $CH_2OH(CH_2)_{14}COOH$; thapsic acid, $COOH(CH_2)_{14}COOH$.

Ether, Anaesthetic. K. Feist. (*Apoth. Zeit.*, 1910, **25**, 298.) Pure ether for anaesthesia requires to be carefully tested, since if not properly stored it may, under the action of light and air, form acetaldehyde, vinyl alcohol, acetic acid, formic acid, H_2O_2, and other decomposition products. It should never be stored in corked bottles, since it may then be contaminated with vanillin from the cork. A good test for the quality of pure ether is to shake up 5 c.c. with 1 c.c. of Nessler's reagent. Perfectly pure ether will be scarcely affected; ordinary ether shows more or less darkening of the separating liquid, proportional to the amount of impurities present.

Ferripyrine, Valuation of. A. Astruc and J. Bouisson. (*J. Pharm. Chim.*, 1910, **1**, 395.) Ferripyrine is readily soluble in water, giving a deep coloured solution from which the iron is precipitated quantitatively by NaOH, as $Fe_2(OH)_6$, and the amount may be determined by direct alkalimetry, using phenolphthalein as indicator. Six molecules of alkali are equivalent to one of ferripyrine, $Fe_2Cl_6,(C_{11}H_{12}N_2O)_3$. If it be desired to determine the antipyrine iodometrically, by Bougault's method (*Y.B.*, **1899**, 103), the above neutralization is indispensable, since the end reaction is otherwise invisible in the coloured solution. After neutralizing with alkali and separating the ferric hydroxide by filtration, the direct iodometric determination gives exact results. Six atoms of iodine are equivalent to one mol. of ferripyrine. The antipyrine in ferripyrine may also be determined by means of picric acid, as follows: A weighed quantity of ferripyrine is dissolved in water, neutralized with NaOH solution, the volume adjusted to 100 c.c., and the solution filtered. Fifty c.c. of the filtrate are then treated with 50 c.c. of N/20 picric acid. After a few minutes' agitation, the antipyrine is completely precipitated as picrate. After filtering, the excess of picric acid in the solution is determined by means of N/20 NaOH solution. Three molecules of picric acid are equivalent to 1 molecule of ferripyrine.

Formaldehyde, Determination of, in Commercial Solutions. O. Blank and Finkenbeiner. (*Pharm. Zeit.*, 1909, **54**, 624.) Formaldehyde is oxidized into formic acid by means of H_2O_2, and the acid thus formed is titrated. Three Gm. of the solution, or 1 Gm. of solid formaldehyde polymer, are treated in a capacious Erlenmeyer flask with 25 to 30 c.c. of 2 × N/ NaOH ; after 3 minutes 50 c.c. of pure neutral, 2·5 to 3 per cent. H_2O_2 solution is run in, through a funnel, to prevent loss by spurting. After standing for 2 or 3 minutes, the funnel is washed down, and the free NaOH remaining is titrated back with 2 × N/H_2SO_4 with litmus indicator. With solutions containing less than 30 per cent. of formaldehyde, the oxidation mixture should be allowed to stand for 10 minutes before titration.

Formaldehyde, Error in the Determination of, by the Official Method of the French Codex, 1908. B. Guerithault. (*Bull. Sci. pharm.*, 1910, **17**, 31). Attention is directed to an error in the official text of the French Codex, **1908,** for the determination of formaldehyde solution, by the method of oxidation with H_2O_2 and subsequent titration of the $HCHO_2$ formed, by means of N/NaOH solution. The amount of free acid present in the volume of H_2O_2 used is directed to be titrated ; and a correction is then to be made from the final reading by *adding* this amount to the volume of the N/NaOH used up in the original titration. It is shown that the correcting factor should be *subtracted from* this figure, and not added.

Fruit Juices, Natural Acids of. F. Muttelet. (*Annales des Falsifications*, 1909, **2**, 383.) Cherry juice contains from 0·82 to 1·61 per cent. of malic acid ; in the other fruit juices the acid was citric in the following percentages : strawberry juice, 1·05 to 1·18 ; raspberry, 2·12 ; white currant, 2·2 ; red currant, 2·08 ; black currant, 3·5 per cent. In none of the above fruit juices was tartaric acid present. If found in commercial samples of these, its presence indicates added matter. Details of processes for separating the organic fruit acids are given.

Glycerin, Suggested Official Tests for, in the U.S.P. T. M. Starkie. (*Amer. J. Pharm.*, 1910, **82**, 253.) *Sp. gr.*, not less than 1·249 at 25°C. *Carbonaceous residue* not to exceed 0·1 per cent. Fifty Gm. of glycerin is heated to flash point in a tared Pt dish ; it is then ignited and allowed to burn out without further heating. The carbonaceous residue is cooled over

H_2SO_4, and weighed. The *ash* obtained by completely incinerating this should not exceed 0·007 per cent. The *Cl* therein should not exceed the equivalent of 0·001 per cent. of NaCl as determined by titration with N/100 $AgNO_3$ and K_2CrO_4 as indicator. *Total acid equivalent*, in terms of NaOH, not to exceed ·02 per cent. One hundred Gm. of the glycerin is dissolved in 100 c.c. of distilled water; 10 c.c. of N/10 NaOH solution is added and the mixture is boiled for 3 or 4 minutes, then titrated with N/10 H_2SO_4 solution. The amount of N/10 NaOH found to be used up by the glycerin should not exceed 6 c.c. *Arsenic* should not exceed 1 part in 100,000 when determined by the Gutzeit test as follows: Five c.c. of a 1 in 10 aqueous solution of the glycerin is placed in a narrow-necked flask with 2 Gm. of zinc, 20 c.c. of HCl (22·5 c.c. concentrated HCl and 77·5 c.c. water). The flask is closed by a filter paper saturated with alcoholic solution of $HgCl_2$, and dried. The neck of the flask contains a roll of cheese cloth impregnated with 10 per cent. lead acetate, to prevent any H_2S from reaching the sensitive paper. The flask, 60–75 c.c., should have a narrow neck, and the circle of paper exposed should be about 1 cm. in diameter. The action is allowed to continue until the greater part of the zinc is dissolved, and at that time the paper should not be stained a distinct yellow or orange. *Silver nitrate test*: An aqueous solution (2 c.c. of glycerin to 10 c.c. of distilled water), with 5 c.c. of N/10 silver $AgNO_3$ solution; the mixture shaken and placed in a dark place for 10 minutes, may assume a slight pink or gray tinge, but must not turn red nor black, nor give a precipitate (limit of Cl and reducing impurities).

Hydrangeol. Y. Asahina. (*Yakougakuzasshi*, **1909** [32]; *J. Pharm. Chim.* [6], **30**, 559.) The phenol, hydrangeol, isolated from the leaves of *Hydrangea hortensis*, var. *azisaiforma*, by Schimayana, has been found also in the flowers, from which it is extracted by alcohol. It has the formula $C_{19}H_{16}O_5$; it forms colourless plates, m.p. 181–182°C.; soluble in alkalies, insoluble in alkali carbonates; it gives a wine-red colour with Fe_2Cl_6. Its diacetyl, dibenzoyl, and tetra-bromo-derivatives have been prepared.

Hydrocyanic Acid, New Sensitive Test for. James Moir. (*Proc. Chem. Soc.*, 1910, **26**, 115.) The following test will detect HCN in a dilution approaching 1 : 5,000,000 of water. The reagent is made

by adding small quantities of copper acetate and acetic acid to a warm solution of hydrocoerulignone (tetramethoxydiphenol) in a large quantity of water, digesting the mixture at 50° for a few hours, and filtering. The solution to be tested is rendered faintly acid with acetic acid (using sodium acetate also if a strong acid is present), and then treated with about one-quarter of its volume of the reagent. In solutions stronger than 1 in 100,000, an immediate crystalline precipitate of coerulignone (red with purple lustre) is obtained; with weaker solutions a brick-red colouration. Oxidizing substances must, of course, be absent, but most of them can be avoided by applying the test on paper exposed to the vapour evolved by the liquid to be tested, as in the guaiacum test. A similar reaction is given by other tetra-substituted diphenols and by benzidine and its derivatives. Benzidine gives an indigo shade; dianisidine, bluish green; and tolidine, a green shade. Although not so sensitive as hydrocoerulignone, these reagents are more trustworthy and keep much better. The colours produced are all derivatives of so-called diphenoquinhydrone.

Igasuric Acid identical with Chlorogenic Acid. K. Gorter. (*Archiv. Pharm.*, 1909, **247**, 197.) The acid originally isolated by Pelletier and Caventou in 1819 from the seeds of *Strychnos nux vomica*, and since known as igasuric acid, is found to be identical with the widely distributed chlorogenic acid, melting at 207°–208°C. Its α_D, given as $-34{\cdot}4°$, is practically that of chlorogenic acid, $-33{\cdot}1°$. Since Pelletier and Caventou isolated the acid by boiling nux vomica with milk of magnesia, it is probable that their so-called igasuric acid was merely quinic acid, resulting from the decomposition of the original chlorogenic acid present.

Inulin, Amount of, in Certain Drugs. L. Rundqvist. (*Svensk Farm. Tidj.*; *J. Pharm. Chim.*, 1910, **1**, 551.) The roots of following drugs belonging to the N.O. *Compositae* yield inulin in the percentages indicated: Artemisia, 9·66; burdock, 46·25; carline thistle, 17·87; coltsfoot, 17·40; chicory, 18·50; elecampane, 35·10; German chamomile, 26·19; Roman chamomile, 35·66; scorsonera, 31·61; dandelion, 39·6; arnica, 5·55.

Iodoform, Estimation of, in Iodoform Gauze. V. Paolini. (*Moniteur Scientif.*, **1909**, **648**.) Ten Gm. of the iodoform gauze, cut small and weighed, is placed in an Erlenmeyer flask of half

a litre capacity; it is covered with 40 Gm. of powdered zinc, the whole moistened with 60 c.c. of 25 per cent. H_2SO_4, and an upright glass tube is attached to the neck of the flask. It is then heated at a moderate temperature for two or three hours on a water-bath or sand-bath, when 40 or 50 c.c. more of the acid is added, and again heated for some hours. The decomposition of the iodoform into HI is very rapid, the end of the reaction being determined by the disappearance of colour from the gauze. It is washed four or five times by decantation with water, and the volume of the liquid made up to 1 litre. Of this liquid, 100 c.c. is placed in a 500 c.c. flask, and 100 c.c. of CS_2 or $CHCl_3$ added, along with a few c.c. of solution of KNO_2. The mixture is shaken, washed three times with CS_2 by decantation, and the iodine titrated with an N/10 sodium thiosulphate, in presence of $NaHCO_3$.

Iodoform, Supposed Formation of, from Alkali Carbonate. A. Labat. (*J. Pharm. Chim.*, 1909, **30,** 107.) The author finds that iodoform is not formed as stated by Guerin (*Y.B.*, **1909,** 44) from alkali carbonate. The trace that the author obtained was due to impurity present in the AmOH, possibly acetone. Some commercial AmOH is found to be capable of giving CHI_3. But when this is fractionated the first portions which distil fail to give the reaction. If the same AmOH is neutralized with H_2SO_4 and distilled, the first few drops which come over will yield a distinct trace of CHI_3 when treated with NaOH and KI and I solution. It is therefore evident that the CHI_3 found by Guerin cannot be derived from the alkali carbonate.

Iodoxy-quinoline-sulphonic Acid: Loretin. G. Mossler. (*Zeitschr. d. allgem. oesterr. Apoth. Verein.*, 1910, 141.) M-iodo-o-oxyquinoline-ana-sulphonic acid, $C_{10}H_4N(OH(I)(SO_3H)$, which is chemically identical with loretin, is prepared as follows:—α-quinoline-sulphonic acid is fused with alkali and so converted to α-oxyquinoline, which on sulphonation gives α-oxyquinoline-ana-sulphonic acid; this is neutralized with KOH and heated with KI and chlorinated lime; on then neutralizing with HCl the calcium salt of m-iodo-o-oxyquinoline-ana-sulphonic acid separates as yellowish-red crystals, from which the free acid is obtained by the further action of HCl. It forms a yellow crystalline powder, almost without smell or taste, soluble with difficulty in cold water (1 in 500), more readily in hot (1 in 70), but little soluble in alcohol, nearly insoluble in Et_2O, $CHCl_3$, and

fixed oils ; the watery solution is of a strong yellow colour, and acid reaction ; it dissolves to a greater extent in aqueous alkalies, forming salts, these solutions being greenish-yellow and slightly fluorescent.

Lime Juice, Detection and Determination of SO_2 in. E. Dowzard. (*Amer. J. Pharm.*, **81,** 561.) The U.S. official method of testing lime juice for the presence of SO_2 by the direct action of pure Zn and HCl and Pb test paper is shown to be fallacious. Pure lime juice pressed by the author, when thus tested gave a positive reaction for H_2S, derived from a natural S-containing constituent of the juice. Lemon juice acts similarly, but to a less degree. The official quantitative test is also erroneous owing to the titration with iodine in the presence of essential oil ; the pure juice, tested by it, gave results indicating the presence of 0·008 per cent. of SO_2. The following methods give accurate results. *Qualitative test* : One hundred c.c. of the juice is acidified with 5 c.c. of 20 per cent. of H_3PO_4 and distilled into 25 c.c. of 1 per cent. solution of $NaHCO_3$ in an absorption flask. The distillate is then placed in an Erlenmeyer flask, a few pieces of pure Zn and 8 c.c. of HCl are added. The flask is plugged with cotton wool, and capped with a Pb test paper. After 30 minutes the latter is examined for discolouration. This will detect less than 1 of SO_2 in 100,000. *Quantitative test* : One hundred c.c. of the juice acidified with 5 c.c. of 20 per cent. H_3PO_4 is distilled in a current of CO_2 into an absorption flask containing 25 c.c. of 1 per cent. $NaHCO_3$ solution, until the total distillate equals 100 c.c. The outlet of the receiver is connected with a U-tube containing another 10 c.c. of $NaHCO_3$ solution. When distillation is finished, the distillate and the solution in the U-tube are bulked and shaken out with two successive 10 c.c. of $CHCl_3$ to remove essential oil, the presence of which would vitiate the results. After separation of the $CHCl_3$, 25 c.c. of N/10 I solution is run in ; the excess of I is then titrated back in the usual way, with N/10 thiosulphate. Each c.c. of N/10 I $=$ 0·0032 Gm. of SO_2.

Linseed Powder, Simple Test for Foreign Vegetable Admixture in. (*Bull. Sci. pharm.*, 1910, **17,** 83.) The quality of commercial linseed, as regards freedom from foreign seeds, tends to deteriorate. Linseed of good quality should not contain more than 1 to 2 per cent. of weed seeds ; but some kinds contain 8 or 10 per cent. or even more. The presence of these in pow-

dered linseed can be readily detected and the amount approximately determined by the following simple expedient. Ten Gm. of the powder is placed in a flat-bottomed beaker, and 80 to 100 c.c. of petroleum benzine is poured on it. Pure linseed powder remains at the bottom of the vessel; but the tissues of other seeds, and fragments of straw or wood, float on the surface, from whence they may be skimmed off with a card, and weighed after drying. An idea of the quality of the linseed powder may, however, be formed by a mere inspection of the floating particles. Carbon bisulphide or petroleum ether may be used as vehicles for this levigation test, instead of petroleum benzine.

Lupeol. N. H. Cohen. (*Rec. trav. Chim., Pays-Bas*, **28,** 368; *Chem. Zentralb.*, 1910, **1,** 650.) Pure lupeol, liberated from the benzoate, occurs in white needles; $C_{31}H_{50}O$; m.p. 215°C. (corr.); $[a]_D$ + 27°2–. Its esters and substitution and oxidation compounds are fully described.

Mace, Bombay, Detection of, in Banda Mace. J. W. Gladhill. (*Amer. J. Pharm.*, 1909, **81,** 537.) One Gm. of the powdered mace is macerated in 10 c.c. of alcohol for two hours, and filtered. Five c.c. of NaClO solution is poured into a test tube, and 2 c.c. of the mace tincture is floated on it. In the presence of the mace of *Myristica malabarica*, a bright red colour will appear at the zone of contact. The tint is more or less fugacious. It is claimed that the admixture of 0·02 per cent. of Bombay mace in genuine mace can be detected thus.

Mace, Analytical Data on Genuine and Adulterated. A. H. M. Muter and C. A. Hickman. (*Pharm. J.*, 1909, **29,** 132.) The nature of the tests for Bombay mace in powdered mace may be enumerated as follows: (1) Microscopical appearance (characteristic and distinctive). (2) Character of colour produced when a slip of filter paper is moistened with an alcoholic solution of the sample and treated with a drop of alkali, the strength and nature of the latter varying with different observers. (3) Repeated extraction of the sample into a series of tubes with fixed quantities of 98 per cent. alcohol, and subsequent addition to each tube of lead acetate solution. True or Banda mace yields no precipitate or colour after the third tube, whilst Bombay mace yields a coloured precipitate even after the twenty-fifth tube. (4) Extraction of the sample first with light petroleum ether, and then with ether, determining

the weight of this second extract. The maximum extract obtained with true mace has been found not to exceed 4·8 per cent., whilst Bombay mace never yields less than 30 per cent. The first three tests are qualitative in character, whilst the fourth is quantitative, and is important in helping to arrive at a conclusion as to the amount of Bombay mace present. In employing the second test it is essential that the alkali used should not be too strong. In the results given below decinormal solution was employed.

Description of Sample.	Per cent. Volatile Ether Extract.	Per cent. Non-Volatile Ether Extract.	Per cent Ether Extract (after Extraction with Petroleum Ether).	Per cent. Mineral Matter.	Colour Test on Filter Paper with N/10 Soda	Microscopical Appearance.
*Java Mace	5·4	24·3	2·25	1·84	Marked buff-pink	—
*Macassar Mace. .	7·4	49·1	2·05	1·68	Faint buff-pink	—
*Bombay Mace. .	5·2	61·0	32·05	1·40	Deep orange-red	—
Sample No. 1	—	34·3	3·48	1·88	Light buff-pink	Genuine mace
,, 2	—	44·1	15·76	1·84	Deep orange-red	Much Bombay mace present
,, 3	—	29·4	3·08	1·81	Light buff-pink	Genuine mace
,, 4	—	28·8	1·70	2·28	Light buff-pink	Genuine mace
,, 5		30·0	1·90	2·00	Light buff-pink	Genuine mace
,, 6	—	30·5	2·80	2·40	Light buff-pink	Genuine mace
,, 7	—	30·7	1·75	2·00	Light buff-pink	Genuine mace
,, 8	--	30·6	2·95	1·84	Marked buff-pink	Genuine mace
,, 9	--	30·8	3·50	2·20	Light buff-pink	Genuine mace
,, 10	—	30·7	2·35	1·80	Light buff-pink	Genuine mace

* Samples ground in laboratory from whole specimens. Samples No. 1–10 purchased in the ordinary way.

(See also *Y.B.*, **1906**, 48; **1909**, 113.)

Mace, Papuan, Detection of, in Powder Mace. C. Griebel. (*Apoth. Zeit.*, 1909, **24**, 644.) Although the whole mace of *Myristica argentea* is easily distinguished from that of *Myristica fragrans*, by its four wide bands, only partially divided, it is not possible to detect the admixture of one with the other by the

microscope, when powdered. The aroma of Papuan or Macassar mace is different from that of the genuine spice, less aromatic, and recalling that of sassafras. Possibly the oil contains safrol. To detect the admixture, 0·1 Gm. of the powder and, as a control, 0·1 Gm. of genuine mace, are shaken up for one minute with 10 c.c. of petroleum ether. After filtration, 2 c.c. of each filtrate is mixed in two twin tubes with an equal volume of acetic acid; H_2SO_4 is then added to each, avoiding mixture. In the case of true mace the colour zone will be yellowish; if Papuan mace be present a red colour appears more or less rapidly. If no colour appears in 1 or 2 minutes the powder is pure, for genuine mace shows a red tint after that time.

Methyl Alcohol, Detection of, in Ethyl Alcohol Preparations. A. Vorisek. (*J.S.C.I.*, 1909, **28**, 823.) The method depends on the conversion of the methyl alcohol into formaldehyde, which is then detected by Hehner's test. The process has the merit of being extremely simple, requiring no elaborate apparatus, and of being applicable to a small amount of material.

Reagents needed.—CrO_3 *solution*, in distilled water, containing 0·8 per cent. of CrO_3, free from H_2SO_4. *Albumin solution.*—The white of one fresh egg is mixed with 50 c.c. of distilled water, filtered, and preserved with a few drops of $CHCl_3$. Less sensitive on long keeping. Aldehyde-free milk answers nearly as well. Fe_2Cl_6 *solution*, containing 0·4 per cent. of Fe_2Cl_6. H_2SO_4, pure, concentrated, and specially free from HNO_2 and HNO_3. *Pumice*, in small pieces.

Procedure.—0·5 to 1·0 c.c. of the sample of alcohol or of an alcoholic distillate is placed in a 6 inch test tube, 1 c.c. of the CrO_3 solution added, and the liquid diluted with water to 4 to 5 c.c. Two or three small pieces of the pumice are dropped in, the test tube connected with a simple tube condenser bent in a Z shape and the liquid distilled into another test tube by boiling briskly over a small flame. When 3 to 4 c.c. of the liquid have passed over, or when only about 0·5 c.c. remains behind in the first test tube, the condenser is detached and rinsed, with about 2 c.c. of distilled water, into the receiving test tube. To the distillate are added: 1 drop of Fe_2Cl_6 solution, 2 drops of albumin solution, and after mixing, 4 to 5 c.c. of the H_2SO_4 are poured in, slowly and carefully as a layer, generation of much heat being avoided. The zone of contact is then observed, without disturbing the liquids, against a white background. A sharply defined

violet zone appears almost at once if the proportion of methyl alcohol is above 5 per cent. With smaller amounts, but more than 1 per cent., the colour shows within one minute ; several minutes will be required for the colour to appear with less than 1 per cent. of methyl alcohol. Pure ethyl alcohol, treated in this manner, gives no colour. When organic impurities (other than methyl alcohol) are present which cannot be removed, a yellow to reddish colour is often obtained, but not violet. The violet colour is intensified on standing or warming, so that the entire liquid becomes coloured violet to lavender if the test tube be placed in boiling water for some time. Dilution with water will diminish the intensity of the colour, which is not affected by glycerin or 50 per cent. H_2SO_4.

Mushrooms, Distinctive Reaction for. M. Loewry. (*Apoth. Zeit.*, 1909, **24**, 923.) An aqueous extract of the edible mushroom, even when extremely dilute, gives an intense violet colour reaction, when floated on strong H_2SO_4, which disappears on warming. *Amanita phalloides*, the very poisonous fungus, which is sometimes mistaken for the edible *Agaricus campestris*, gives a yellow reaction under similar conditions.

Paraffin, Soft, Detection of Fats in. A. Ferraro. (*L'Union pharm.*, 1910, **50**, 400.) A reagent is prepared by adding to an aqueous saturated solution of acid fuchsine just enough AmOH to discharge the colour. Four or 5 Gm. of this is then intimately mixed, in the cold, with 20 Gm. of the soft paraffin. If the latter be pure, no red or pink colour will be evident, but if animal or vegetable fats are present, a more or less marked red tint will appear.

Phenazone Solution for Iodometry. F. Borde. (*Bull. Sci. Pharm.*, 1909, **16**, 654.) Alcoholic solution of antipyrine, 18·8 Gm. in 1,000 c.c. of alcohol 50 per cent., is recommended as a substitute for thiosulphate solution for the determination of iodine, especially in the iodine absorption tests of fixed and essential oils. One c.c. of the above strength is equivalent to 0·0254 Gm. iodine. The end reaction is very sharp ; the solution is stable, and phenazone is more readily obtained pure than thiosulphate.

Resorcinol, Characteristic Reaction of, with $CuSO_4$ and KCN solutions. Volcy-Boucher and J. Girard. (*Répertoire Pharm.*, 1909, **21**, 433.) A few c.c. of the liquid to be tested

are treated with a few drops of 10 per cent. solution of $CuSO_4$, followed by an equal volume of 10 per cent. KCN solution. On shaking, a reddish colour is developed; the mixture is then diluted with water to a reddish-yellow tint. When observed by reflected light it will show a very marked green fluorescence in the presence of resorcinol. This fluorescence is quite distinct with a dilution of 1 in 10,000. (See also p. 155.)

Saccharin and other Artificial Sweetening Agents, Detection of, in Food and Beverages. A. Bianchi and E. di Nola. (*Bull. comm.*, **37,** 479.) The liquid under examination is freed from any alcohol present by evaporation; acidified with $HC_2H_3O_2$, 20 drops for every 100 c.c., and treated with normal lead acetate solution in excess. After standing for 30 minutes, excess of a 1 : 5 solution of Na_2SO_4, containing the same amount of Na_2HPO_4, is added, and the precipitated lead salts are removed by filtration. The filtrate is concentrated to a small volume on the water-bath, and acidified with dilute (1 : 2) H_2SO_4. It is then shaken with a mixture of equal volumes of ether and pure benzene. On evaporating the benzene-ether extract, saccharin and its ammonium compound, dulcite or sucramine, will leave a sweet residue. If salicylic acid should accompany the saccharin this must be eliminated by oxidizing the residue with $KMnO_4$ and H_2SO_4. The oxidation liquid is then again shaken with the benzene-ether solvent. Saccharin, if present, remains unoxidized, and can be detected in the benzene-ether residue.

Saccharin, Detection of, in Foods and Beverages. F. A. Genth, Junr. (*Amer. J. Pharm.*, 1909, **81,** 536.) The absence of salicylic acid having been proved in a part of the residue from an ethereal extract, the remainder is dissolved in 1 c.c. of water made slightly alkaline with AmOH, transferred to a small crucible and evaporated to incipient dryness. A drop or two of water and a very small piece of NaOH were then added, and the whole quickly heated to dryness; when dry, the mass is further heated until fusion takes place; after cooling, 1 c.c. of water is added, and then the larger portion of alkali neutralized with dilute acid (either HCl or H_2SO_4). After adding one or two drops of a 1 per cent. ferric alum solution, the neutralization is continued by dropping the acid from a fine pipette and stirring the solution. Where large amounts of saccharin are present the violet colour can be seen at the point of neutrality; in small quantities this point is frequently missed,

but a careful back titration with a very dilute alkaline solution (very dilute AmOH, 1 : 20) generally indicates its presence. In case of negative results, or where further verification is necessary, the solution may be acidulated, and extracted in a separatory funnel with 10 c.c. of ether, washed, concentrated, and tested in the usual manner. The author claims that as little as four Mgm. of saccharin in a litre can be detected with certainty in 50 c.c. of a solution subjected to this method of analysis.

Vanillin, Reactions to Distinguish from Coumarin. (*Schweiz. Woch. Chem. Pharm.*, 1909, **47,** 463.) An aqueous solution of vanillin gives a blue colour with Fe_2Cl_6, which changes to brown when heated ; on cooling, a white precipitate of dehydro-divanillin is thrown down. A 1 : 100 solution of vanillin in acetic acid gives a greenish blue colour when mixed with an equal volume of H_2SO_4. A 1 : 100 solution of vanillin in EtOH gives a green colour with an equal volume of H_2SO_4 ; and on heating, this changes first to dark red, then to violet. Coumarin gives none of these reactions.

Water, Distilled, Catalytic Oxidizing Property of. L. Tixier. (*Bull. Sci. pharm.*, 1910, **17,** 82.) Commercial distilled water, although responding perfectly to the official tests for purity, gives distinct oxidizing reactions, and acts exactly as an oxidase ; giving a blue colour with H_2O_2 and fresh guaiacum emulsion and with acetic solution of benzidine, and with Mayer's phenolphthalein reagent. It loses this property when re-distilled from a glass retort. It is presumed that this action is due to infinitesimal particles of Cu, derived from the distilling plant ; although the amount present is too small to give a direct chemical reaction. River, tap, well, and mineral waters do not possess this property. Some commercial distilled waters react as strongly with Mayer's phenolphthalein reagent as the proprietary medicinal preparation known as "electrargol."

Wine Vinegar. (*Evans' Analyt. Notes*, **1909,** 58.) The following are typical figures for genuine wine vinegar. From *Spanish red wine*: Sp. gr., 1·017 ; acetic acid, 5·9 per cent. ; extractive, 2·16 per cent. ; ash, 0·46 per cent. *Spanish white wine* : Sp. gr., 1·012 ; acetic acid, 4·8 per cent. ; extractive, 1·21 per cent. ; ash, 0·2 per cent. *French white wine* : Sp. gr., 1·010 ; acetic acid, 7 per cent. ; extractive, 0·5 per cent. ; ash, 0·04 per cent.

PLANT ANALYSIS

Adenium hongkel, Toxic Principle of. E. Perrot and M. Leprince. (*Comptes rend.*, **149,** 1393.) The flowering tops of the Apocynaceous shrub, *Adenium hongkel*, are used as an ordeal poison by the natives of the French Soudan, by whom it is named "Kidi-samaró"; in other districts it is known as "bouron" and "kourané." From the hydro-alcoholic extract, by shaking out with $CHCl_3$, distilling off that solvent, redissolving the residue in 95 per cent. alcohol, precipitating with water, again redissolving in $CHCl_3$ and further purifying, the authors have isolated the toxic principle in the form of a bright yellow amorphous powder. It is not an alkaloid, containing no nitrogen; it gives no indication of a glucosidal character; nor has it acid properties. It is a violent heart poison, and appears to resemble strophanthin in its action; it is also an active sternutatory, requiring extreme caution in handling. Its chemical formula is $C_{20}H_{31}O_8$; m.p., 84–85°C.; quite insoluble in water and in C_6H_6; very soluble in EtOH and in $CHCl_3$; soluble in Et_2O and other organic solvents. It affords an intense reddish-violet colour reaction with strong H_2SO_4.

Ajuga iva, Constituents of. U. Ponti. (*Gazz. Chim. ital.*, 1909, **39,** 349.) No alkaloid nor glucoside was separated from the herb. When boiled with $Ca(OH)_2$ and filtered a deep orange-red solution was obtained. On acidifying this with HCl, saturating with AmCl and shaking out with Et_2O, an acid was separated crystallizing in needles, m.p., 170°C. This was identified as being ferulic acid, $CH_3(OH)(OCH_3){\cdot}CH : CH{\cdot}COOH$. *Ajuga iva* is a native of Sardinia, where it is known as the "fever herb," and is highly esteemed as a remedy for malarial fever.

Celtis reticulosa, Presence of Indole and Skatole in Wood of. C. A. Herter. (*J. Biolog. Chem.*, 1909, 48; *Apoth. Zeit.*, 1909, **24,** 885.) In the specimen of this wood examined by Dunstan (*Y.B.*, **1889,** 38) skatole was present, but no indole. Herter has found both indole and skatole. The latter was present only in the trunk wood, and not in that of the branches, nor in the roots or bark.

Colocynth, Constituents of. F. B. Power and C. W. Moore (*Trans. Chem. Soc.*, **1910, 97, 99.**) Colocynth pulp freed from seeds

was extracted with EtOH. The portion of this extract soluble in water was found to contain a new dihydric alcohol, *citrullol*, $C_{22}H_{36}O_2(OH)_2$, m.p. 285°–290°C., and a feebly basic amorphous alkaloidal substance. The latter has an extremely bitter taste and possesses purgative action. The portion of the alcoholic extract insoluble in water, consisting chiefly of resinous material, contained α-elaterin, m.p. 232°C., $[\alpha]_D - 68{\cdot}9$ in $CHCl_3$. In the same portion of the extract there were also found hentriacontane, and a phytosterol, $C_{27}H_{46}O$, m.p. 160°–162°C. and optically inactive. The Et_2O and $CHCl_3$ extracts of the resin possessed marked purgative properties, even after the removal of the active alkaloidal substance. The seeds were found to contain traces of an alkaloidal substance, a small amount of an enzyme, which hydrolyses β-glucosides, and 12·72 per cent. of a fatty oil. From the oil there was obtained a small amount of a phytosterol, $C_{20}H_{34}O$, which melted at 158°–160°C. and had $[\alpha]_D + 8{\cdot}1°$ in $CHCl_3$. (See also *Y.B.*, **1907,** 402; **1909,** 28.)

Cucurbita citrullus Seed, Chemical Examination of. F. B. Power and A. H. Salway. (*J. Amer. Chem. Soc.*, 1910, **32,** 360.) The seeds of the water melon have been employed in domestic medicine as a diuretic. Chemical examination of the shells and kernels of the seeds have failed to indicate the presence of any alkaloid, glucoside or other definite compound likely to possess physiological activity. The oil and resin obtained from these were found by H. H. Dale to be without any obvious action and certainly quite innocuous. The kernels yielded, on expression, 7·4 per cent. of oil, calculated on the entire seed, and 19 per cent. to extraction with petroleum ether. The expressed oil had the sp. gr. 0·9233 at 20/20°C.; α_D, 0; acid value, 3·9; saponification value, 191·8; iodine value, 121·1. It contained the following glycerides: of linoleic acid, 45 per cent.; of oleic acid, 25 per cent.; of palmitic and stearic acids, together, 30 per cent. A small amount of a phytosterol, $C_{20}H_{34}O$, m.p. 163–164°C., was obtained. It, therefore, agrees very closely with the oil of *Cucurbita pepo* seed (*infra*). The presscake yielded a further 6 per cent. of oil, soluble proteins, sugar, and some resinous matter. From the last a very small amount of a phytosterol, m.p. 158–159°C., and a new alcohol *cucurbitol*, $C_{24}H_{40}O_4$, m.p. 260°C., were isolated. Cucurbitol appears to be allied to grindelol, $C_{23}H_{38}O_4$ (*Y.B.*, **1908,** 88), and ipurganol, $C_{21}H_{34}O_4$. The shells contained a quantity of fatty oil similar to that from

the kernels; but it also gave a small amount of arachidic acid as well. The resin contained a phytosterol, m.p. 138–140°C., and more cucurbitol. Traces of Cu were detected.

Cucurbita pepo Seed, Chemical Examination of. F. B. Power and A. H. Salway. (*J. Amer. Chem. Soc.*, 1910, **32,** 346.) Pumpkin seed and its oil have long been popularly considered to be harmless but effective taenifuges. Woolf and Heckel, however, have attributed this action to the resinous constituents of the seed apart from its oil. The latter has stated that the oil alone, free from resin, is devoid of physiological action. Chemical experiments, conducted at the instance of the authors, with both oil and resin fail to indicate that either have any definite action as vermifuges, and no alkaloid, glucoside or other substance having any marked physiological activity was isolated either from the kernels or shells of the seed. The kernels, separated as completely as possible from the shells, yielded 19·3 per cent. of fatty oil to expression. The entire ground seed gave 34·3 per cent. on extraction with petroleum ether. The expressed oil had the following characters: Sp. gr., 0·9220 at 20/20°C.; a_D, 0; acid value, 3·4; saponification value, 189·4; iodine value, 119·7. The oil contained, as glycerides, linoleic acid, 45 per cent.; oleic acid, 25 per cent.; palmitic and stearic acids, 30 per cent. No myristic acid, previously recorded as being present, was detected. It contains a small amount of a phytosterol, $C_{27}H_{46}O$, m.p. 162–163°C., and apparently another substance of this class with a lower m.p. The presscake, after the expression of this, yielded a further 8·7 per cent. of oil agreeing in general characters with that obtained by pressure. It also yielded soluble proteins; a quantity of sugar; a small trace of salicylic acid; and resinous material, amounting to 0·5 per cent. of the entire seed. This resinous portion contained a phytosterol, m.p. 157–159°C., apparently identical with that found in the oil; and a new mono-carboxylic acid, m.p. 99°C., agreeing in composition with a hydroxycerotic acid, $C_{25}H_{51}O{\cdot}COOH$, yielding an ethyl ester, m.p. 61°C. The shells, amounting to 20·8 per cent. of the entire seed, yielded to hot EtOH 2·9 per cent. of fatty oil, similar to the above, sugar, and a small amount of resinous matter, also traces of copper.

Dura-santalin from Red Millet. A. G. Perkin. (*Proc. Chem. Soc.*, 1910, **26,** 23.) The leaf sheaths and stems of a red variety of the great millet, *Andropogon sorghum*, contain a red

colouring matter, *dura-santalin*, $C_{16}H_{12}O_5$, closely allied to santalin from *Pterocarpus marsupium*. It is a scarlet crystalline powder, soluble in alkalies with a violet-red colour.

Ecballium Elaterium Fruit, Constituents of. F. B. Power and C. W. Moore. (*Trans. Chem. Soc.*, 1909, **95**, 1985.) The alcoholic extract of the fresh fruit yielded, on concentration, a quantity of a green resin, and, on further evaporation, a small amount of a brown resin. From the latter nothing definite could be isolated, except a small quantity of "elaterin." The green resin, when systematically examined, yielded a small amount of a hydrocarbon, m.p. 68°C., probably hentriacontane, $C_{31}H_{64}$; a phytosterol, $C_{27}H_{46}O$, m.p. 148°C., $[\alpha]_D = +3{\cdot}2°$ in chloroform; a substance melting at 258°–260°C., apparently allied to ipuranol, $C_{23}H_{38}O_2(OH)_2$; a mixture of fatty acids; and "elaterin." The authors have previously shown that this crystalline "elaterin" is not a simple body, but is separable by fractional crystallization into a laevo-rotatory, physiologically inert substance, and a dextro-rotatory substance of high physiological activity, of apparently the same percentage composition; the former has been named α-elaterin, and the latter β-elaterin. Official "elaterin" contains from 60 to 80 per cent. of α-elaterin. No evidence was obtained of a glucoside of elaterin, nor of any other glucoside. The "elaterin" occurs, as such, in the fruit. The portion of the alcoholic extract soluble in water contained a sugar which yielded *d*-phenylglucosazone, m.p. 216°C.

Jalap, Chemical Investigation of. F. B. Power and H. Rogerson. (*J. Amer. Chem. Soc.*, 1910, **32**, 80.) Jalap resin is found to be more complex in composition than has hitherto been assumed. None of the amorphous products isolated from it have the attributes of a homogeneous substance. The chemical formulae which have been attributed previously to the various constituents are therefore devoid of significance. In the course of the present examination a number of substances have been isolated which could be identified, but those resulting from the degradation of an amorphous product of the resin cannot be expressed by simple chemical equations. The purgative action of jalap is not due to any single well-defined constituent, since all, excepting the petroleum ether extract, appear to possess the same degree of physiological activity.

The definite constituents isolated from the alcoholic extract of the drug comprise: a trace of *essential oil*, at first pale yellow,

becoming darker on standing; odour smoky and unpleasant; sp. gr., 0·8868 at 20°/20°C.; optically inactive; giving a red colour reaction in alcoholic solution with Fe_2Cl_6. The water soluble portion of the same extract contained colouring matter and sugar, the latter yielding dextro-phenyl-glucosazone, m.p. 217-218°C. The portion insoluble in water formed the "resin of jalap" of pharmacy. This amounted in the parcel of drug under examination to 9·4 per cent. Of this 11·6 per cent. was soluble in Et_2O. This crude resin, when purified with animal charcoal, had the a_D − 37°C. The *petroleum ether extract* of the resin amounted to 1·9 per cent. It contained *free palmitic* and *stearic acids*, and *formic, butyric* and *higher volatile acids* combined as esters; also a mixture of unsaturated acids, mainly *linolic acid.* The unsaponifiable portion contained a *phytosterol*, $C_{27}H_{46}O$; m.p. 134–135°C.; cetyl alcohol, $C_{16}H_{34}O$; a small amount of a substance, $C_{18}H_{36}O$, m.p. 56–57°C., giving colour reactions similar to a phytosterol. The *ether extract* of the resin, amounting to 9·7 per cent., contained a small amount of a new alcohol, *ipurganol*, $C_{21}H_{32}O_2(OH)_2$, crystallizing in colourless needles, m.p. 222–225; $[a]_D$, in pyridine, − 36°. It gives colour reactions similar to phytosterols. Besides this, further treatment isolated a little phytosterol and cetylalcohol, small amounts of volatile acids, and a quantity of amorphous products. The *chloroform extract* of the resin amounted to 22 per cent. It yielded a little β-methylaesculetin. On treatment with dilute alcoholic H_2SO_4 it gave *formic, butyric, dextromethylethylacetic,* and *convolvulipolic acid*, $C_{15}H_{30}O_3$, and a higher homologue, $C_{17}H_{34}O_3$. It also gave amorphous products, and a considerable amount of sugar, indicating that a portion had a glucosidal nature. The *acetic ether extract*, 22 per cent., contained no distinctive bodies. *Alcohol extract of the resin*, amounting to 38·8 per cent. of the whole, was obtained nearly white when treated with animal charcoal; m.p. 150–160°C.; $[a]_D$ − 37·1°. When fused with KOH it gave *formic, acetic, butyric, valeric* and *higher volatile acids* with *azelaic* and *sebacic acids*. When hydrolized with $Ba(OH)_2$ it yielded *dextromethylethylacetic acid*, several other acids, and a complex *amorphous hydrolysed resin*. This latter gave amorphous products to Et_2O, $CHCl_3$, $Et\bar{A}$; all of which yielded sugar when hydrolysed with dilute acid. The EtOH extract was almost colourless; $[a]_D$ − 33·53; m.p. 110–115°C. It gave on hydrolysis, besides other acids and sugar, *convolvulinolic* and *ipurolic* acids, the latter, $C_{13}H_{25}(OH)_2{\cdot}COOH$, having been

previously found in the stems of *Ipomoea purpurea* (*Y.B.*, **1908,** 98). (See also *Y.B.*, **1886,** 220; **1887,** 219; **1888,** 177; **1891,** 213; **1893,** 162; **1903,** 247; **1907,** 147; **1908,** 101, 448; **1909,** 45, 81.)

Maté, Chemical Constitution of. G. Bertrand and T. Devuyst. (*Bull. Sci. pharm.*, 1910, **17**, 250.) The dried leaves of *Ilex paraguayensis* have the following constituents: Loss at 110°C., 10·5; ether soluble extract, 16·57; organic matter soluble in water, 30·79; water-soluble inorganic matter, 3·78; caffeine, 2·02; sugars, as glucose, 6·08; tannin, 11·22; water-insoluble organic matter, 52·72; water-insoluble mineral matter, 2·2; total nitrogen, 2·13; total ash, 5·98 per cent.

Ornithogalum thyrsoides, Chemistry of. F. B. Power and H. Rogerson. (*Pharm. J.*, 1910, **30,** 326.) The plant, common in Cape Colony, is reputed to be poisonous, many deaths among horses being attributed to it when mixed with forage. The entire dried plant was employed in the investigation. It was found by a preliminary test that the plant contained no alkaloid. An alcoholic extract of the plant, when distilled with steam, yielded a very small amount of an essential oil, with traces of palmitic acid. The water-soluble portion of the extract contained a considerable quantity of inorganic salts, together with amorphous products, and a sugar which yielded *d*-phenylglucosazone, melting at 212–213°C. The water-insoluble portion of the extract consisted of a dark green resin, and amounted to about 4 per cent. of the weight of the entire dried plant. This resin, when extracted successively with light petroleum (boiling-point 35–50°), Et_2O, $CHCl_3$, ethyl acetate, and EtOH, was resolved into a number of products, each of which was separately examined. The petroleum extract yielded a considerable amount of palmitic acid, which was present both in a free and combined state, together with pentatriacontane, $C_{35}H_{72}$, a phytosterol, $C_{27}H_{46}O$ (m.p. 133–134°C.; $[\alpha]_D - 33{\cdot}6°$), and a very small amount of volatile fatty acids. The Et_2O extract consisted chiefly of resinous material, but from it there was isolated a small amount of the dihydric alcohol, ipuranol, $C_{23}H_{38}O_2(OH)_2$. The specific rotatory power of ipuranol is $[\alpha]_D - 37{\cdot}2°$, whilst its acetyl derivative has $[\alpha]_D - 25{\cdot}4°$. The $CHCl_3$, ethyl acetate, and EtOH extracts were all dark-coloured amorphous products. The $CHCl_3$ extract, after acid hydrolysis, yielded a very small amount of a crystalline substance melting

at 176–180C., but otherwise nothing definite could be obtained from any of these products. The reputed poisonous properties of the plant have been fully confirmed, inasmuch as the administration of 5 Gm. of the ground air-dried material to guinea-pigs was attended with fatal results. The toxic principle appears to be chiefly contained in the resin, and especially in that portion of the latter which is soluble in Et_2O. As, however, all the extracts obtained by the successive treatment of the resin with various solvents were physiologically active, with the exception of the portion removed by light petroleum, there are apparently several poisonous substances present. The attempts to obtain a definite active principle from these various products were, however, unsuccessful.

Plants, Garden, Nitrogen and Mineral Constituents of. A. Hébert and G. Truffaut. (*Bull. Soc. Chim.*, 1910, **7**, 31.) A table is given showing the nitrogen, ash, and composition of the ash of over 50 genera of commonly grown horticultual plants. The indications are valuable for the modification of chemical manures to suit different species.

Pyrethrone, the Active Principle of Pyrethrum Flowers. J. Figitani. (*J. Pharm. Chim.*, 1909, **30**, 407.) Pyrethrone, an unstable ether, decomposing on exposure to the air, is stated to be the active principle of insect flowers. It forms a neutral, amber yellow syrup; insoluble in water; readily dissolved in Et_2O, EtOH and $CHCl_3$. When saponified it yields the alcohol pyrethrol, and some unidentified acids. Pyrethrone is a nerve poison, and acts as an irritant of the motor nerves of central system of frogs. Fish and insects are very susceptible to its action. In animals with warm blood pyrethrone excites the medullary centres.

Rhus, Poisonous Principle of. L. E. Warren. (*Pharm. J.*, 1909, **29**, 532, 562.) An exhaustive review of the literature of the subject, with the results of original investigations by the author. In the purest state in which the author has been able to obtain the toxic principle it is a clear, pale, amber-red, adhesive, viscous, transparent liquid, of the consistence of thick syrup, and having a distinct, characteristic, but not unpleasant odour. It is a powerful escharotic, one Mgm. producing very severe blistering when placed upon the arm for 15 minutes. It is not a caustic in the sense that KOH or H_2SO_4 are corrosive, since it produces

no escharotic effect on the skin of a cadaver. When mixed with water and "laccase," the gum-enzyme from the latex, in proper proportions and exposed to the air, it soon forms the characteristic black non-toxic varnish. There is no known chemical test for the poison. Although all of the resinous products from the latex of the rhus give black compounds with the alkali hydroxides, which are in a sense characteristic, and the solubility in a large excess of petroleum ether is a useful preliminary procedure, biological tests only can differentiate between the active and the inert resins. If kept without heat or in alcoholic solution the poisonous substance is a stable compound. It is a highly hydroxylated compound. Probably it will eventually be found that the irritating properties are in some way connected with the presence or the relations of these hydroxyl groups, for if the toxic substance be acetylized and the resultant non-poisonous product be saponified, the regenerated resin is non-poisonous. The properties of its esters and its behaviour with ferric salts indicate that it has phenolic properties. It is a singular fact that none of its known compounds are poisonous. The supposed immunity of some individuals to the effects of rhus poison is non-existent, although some are doubtless more susceptible to its action than others.

Rumex ecklonianus, Constituents of. F. Tutin and H. W. B. Clewer. (*J. Chem. Soc.*, 1910, **97**, 1.) The plant is a native of South Africa, where it is reputed to possess medicinal properties. The material investigated comprised the whole herb except the roots. The alcoholic extract contained a trace of a substance crystallizing in yellow prisms, m.p. 159°C., together with a small amount of essential oil. The following substances were isolated from the non-volatile portion: Ceryl alcohol; a phytosterol, $C_{20}H_{34}O$, apparently identical with rhamnol; palmitic, stearic, oleic, linolic, and isolinoleic acids; a small amount of ipuranol, $C_{23}H_{38}O_2(OH)_2$; kaemferol; chrysophanic acid; emodin, emodin-monomethyl-ether, with traces of other crystalline substances and much inorganic matter. A sugar which yielded dextrophenyl-glucosazone was present, but no evidence could be obtained of the presence of a glucoside. The extract was mildly purgative in action.

Siris. D. Hooper. (*Ann. Rept. Indian Museum, Industrial Section*, **1909**, 16.) *Siris* or *sirish* is a yellowish powder composed of the roots of *Eremurus aucherianus*, N.O. *Seliaceae.*

It has a sweetish taste, like that of licorice. It forms an adhesive vegetable glue with water, and is employed for moulding into vessels for containing oil. Its composition is as follows: Moisture, 9·75; sugar, etc., 19·50; mucilage, 45·17; albumin, 5·93; fibre, 12·00; ash, 7·65 per cent.

Tansy Extract, Constituents of. H. Matthes and H. Serger. (*Archiv. Pharm.*, **247,** 418.) *Extractum tanaceti* yields about 20 per cent. of crude resins, insoluble in water. Of this about 30 per cent. is insoluble, and 70 per cent. soluble, in absolute alcohol. Ether separates the latter alcohol-soluble part into soluble fats and insoluble resin. A further quantity of an ether soluble resin is obtained by shaking out the watery extract with that solvent. Among the fatty acids separated from the oils are an oleic acid identical with lycocopodium-oleic acid; also a solid acid, probably daturinic acid, and stearic acid. The unsaponifiable portion contains a phytosterol, m.p. 135°C.; melissyl alcohol, m.p. 87°C.; two oxygenated bodies, $C_{15}H_{30}O_5$, b.p. under 18 mm., 180°–200°C.; and $C_{24}H_{42}O$, b.p. under 18 mm., 208–300°C.; and a hydrocarbon, $C_{25}H_{40}$, b.p. under 18 mm., 200–208°C.

Tephrosia macropoda from Natal. E. M. Holmes. (*Pharm. J.*, 1910, **30,** 50.) Plugge has examined a portion of a museum specimen of the root of this leguminous plant, and finds that it does not contain cytisine, as was supposed might be the case, from its toxic physiological action; it contains a non-alkaloidal active principle which is a heart poison. Other members of the genus are used as fish poisons. (*Y.B.*, **1905,** 202; **1907,** 159; **1909,** 90.)

Trifolium incarnatum, Constituents of the Flowers of. Harold Rogerson. (*Proc. Chem. Soc.*, 1910, **26,** 112.) The dried flowering tops of the carnation clover (*Trifolium incarnatum*, Linné), when extracted with alcohol and the resulting extract distilled in a current of steam, yielded a small amount of an essential oil, which contained furfuraldehyde, and possessed the following constants: Sp. gr. = 0·9597 20°/20°C.; a_D − 1°48′. The portion of the alcoholic extract soluble in water contained a quantity of a sugar which yielded *d*-phenylglucosazone (m.p. 205–206°), and from the aqueous liquid the following definite substances were isolated: Benzoic and salicylic acids in very small amount, with apparently a trace of *p*-coumaric acid; pratol, $C_{16}H_{12}O_4$; quercetin, $C_{15}H_{10}O_7$; and a new glucoside

of the latter, *incarnatrin*, $C_{21}H_{20}O_{12},3H_2O$, m.p. 242–245°. The portion of the alcoholic extract which was insoluble in water consisted chiefly of resinous material, but from it the following compounds were obtained: An alcohol, $C_{34}H_{69}OH$, m.p. 72–74°, which had previously been obtained from the wax of the bumble-bee, and which it is now proposed to designate *incarnatyl alcohol*; hentriacontane, $C_{31}H_{64}$; a phytosterol, $C_{27}H_{46}O$ (m.p. 135–136°; $[a]_D$ − 41·7°); trifolianol, $C_{21}H_{34}O_2$ $(OH)_2$ (m.p. 295–300°; $[a]_D$ − 44·1°); and a mixture of fatty acids.

Trifolium pratense Flowers, Constituents of. F. B. Power and A. H. Salway. (*Proc. Chem. Soc.*, 1910, **26**, 20.) The alcoholic extract representing 37·1 kilo. of dried flowers of red clover, gave 10·5 Gm. of essential oil when steam distilled; sp. gr. 0·9476 20/20°C.; a_D + 4°0′; it contained furfural. The portion of the extract soluble in water contained a large amount of *sugar*, giving *d*-phenylglucosazone, m.p. 205°C.; *salicylic* and *coumaric acids*; *isorhamnetin*, probably present as a glucoside; a new phenol, *pratol*, $OH{\cdot}C_{15}H_8O_2{\cdot}OCH_3$, m.p. 253°C.; *pratensol*, $C_{17}H_9O_2(OH)_3$, m.p. 210°C.; *a yellow compound*, $C_{16}H_{10}O_7$, m.p. 280°C.; *a substance*, $C_{15}H_7O_3(OH)_3$, m.p. 225°C.; *a substance*, $C_{14}H_{12}O_6$, m.p. 214°C.; also the following new glucosides: *trifolin*, $C_{22}H_{22}O_{11},H_{20}$, m.p. 260°C., which yields, on hydrolysis, the yellow colouring matter; *trifolitin*, $C_{16}H_{10}O_6$, m.p. 275°C., and rhamnose; *isotrifolin*, $C_{22}H_{22}O_{11}$, m.p. 250°C., and a *glucoside of quercetin*, m.p. 235°C. The portion of the extract insoluble in water was mainly resinous; but it contained the following: *Myricyl alcohol*, $C_{31}H_{63}{\cdot}OH$; *heptacosane*, $C_{27}H_{56}$; *hentriacontane*, $C_{31}H_{64}$; *sitosterol*, $C_{27}H_{46}O$, m.p. 135–136°C.; a_D − 34·4°; a new dihydric alcohol, *trifolianol*, $C_{21}H_{34}O_2(OH)_2$, m.p. 295°C., a mixture of fatty acids and a small amount of *pratol*, $C_{16}H_{12}O_4$, the latter having evidently been present in the resin as a glucoside.

Urease, Presence of, in Soy Beans. T. Takeuchi. (*Apoth. Zeit.*, 1909, **24**, 885.) Soy beans, the seeds of *Glycine hispida*, contain a very active urease, which is soluble in water, and at once liberates NH_3 from urea, but not from other closely allied nitrogenous substances. An aqueous infusion of soy beans serves, therefore, as a reagent for urea; the liquid to be tested is treated with this, some phenolphthalein indicator is added, and the mixture is set aside. In presence of urea, a red colour

is quickly developed. Under the influence of soy infusion fresh urine gives off quantities of ammonia.

Vaccinium vitis-Idaea, V. oxycoccos, V. macrocarpum, Constituents of Fruits of. C. Griebel (*Zeits. Untersuch. Nahr. Genussm.*, 1910, 241 ; *Apoth. Zeit.*, 1910, **25,** 201) ; also A. Nestler (*Pharm. Zentralh.*, 1910, **51,** 9). All three berries contain benzoic acid, partly free and partly combined as ester. The fruit of *Vaccinium vitis Idaea* contains from 0·088 to 0·224 per cent. of total benzoic acid, of which 0·054 to 0·144 per cent. is in the free state. The other fruits contain similar constituents in less quantity. *Vaccinium vitis-Idaea* also contain more sugar and less fruit acids and pectin than the other kinds. The formation of benzoic acid commences when the fruits begin to turn red and continues during ripening. In the crushed berries and in the cold pressed juice the free benzoic soon disappears, being apparently esterified. Ripe berries of *V. vitis-Idaea* contain about 0·1 per cent. of the glucoside *vacciniin*, which is a glucose benzoic ester, $C_6H_{11}(C_6H_5CO)O_6$. This forms an almost insoluble phenylhydrazone, $C_6H_{11}(C_6H_5CO)O_5(N_2HC_6H_5)$, m.p. 135–136°C. Nestler independently confirms these results and gives methods for the microchemical localization of the acid. He also finds it in the fruit of *V. uliginosum*, as well as in the above species.

Vanilla, Constituents of. (*Schimmels' Report, Oct.*, **1909,** 142.) Good vanilla contains about 2 per cent. of vanillin ; but the determination of this throws no light on the quality of the vanilla. Ethereal extract of Tahiti vanilla was treated with NaOH to remove vanillin, and was then steam distilled. The distillate was a brown aromatic oil, heavier than water. It contained anisic alcohol with a little anisic aldehyde. Anisic acid was also found in the alkaline solution. The heliotropin found by Busse in Tahiti vanilla could not be detected. (See *Y.B.*, **1904,** 250.)

MATERIA MEDICA

NEW REMEDIES.

Adonidin as an Optical Anaesthetic. Schidlowski. *Merck's Report*, 1909, **22**, 115.) Although not so powerful as cocaine, adonidin is an active anaesthetic when applied to the eye. Three drops of a 1 per cent. solution allay pain in glaucoma; the same has been employed to produce anaesthesia previous to operation for cataract. Two drops of a 2 per cent. solution produces complete anaesthesia in 25 minutes, which lasts for 3 or 4 hours. The instillation is followed by immediate inflammation, and it is necessary to wait about an hour before operating, until this has passed off.

Adrenine as an Emergency Treatment in Cases of Non-corrosive Poisoning. J. L. Jona. (*Intercolonial Med. J. Australas.*; *Lancet*, 1909, **177**, 1012.) From experiments performed on rabbits it seems that the administration of adrenine solution by the mouth so far hinders absorption that it is a useful antidote in the case of rapidly acting poisons, such as KCN, and strychnine. Thus given, it arrests the action of the poison, and allows time for the administration of chemical antidotes. It will exert its vaso-constrictor action after the arteriolar wall has been subjected to the action of KCN. In cases of poisoning from this and similar quickly acting poisons 3 drachms of the 1 : 1000 solution of adrenine diluted to 4 fluid oz. with water should be given, followed by the appropriate antidote. The stomach should then be washed out and a further dose of 90 minims of adrenine solution, diluted, given.

Amenyl. (*Apoth. Zeit.*, 1909, **24**, 871.) This is methylhydrastimide hydrochloride, introduced as a remedy for functional amenorrhoea and similar affections. The dose is one grain twice daily. It occurs in needles, m.p. 227°C. It is soluble in warm water.

Amido-azotoluol "Agfa" Ointment and Gauze. Hayward and Schmeiden. (*Apoth. Zeit.*, 1910, **25**, 54.) Amido-azotoluol, 8; vaseline, 100, spread in a thin layer on gauze and applied over the affected surface, is preferable to the ointment of "Scarlet R." which has been used in certain skin diseases. In otological work, Grossmann finds that a 4 per cent. gauze of amido-azotoluol may usefully replace the ointment, in some cases.

Aniline Emetic, Aniline Antimonio-Tartrate. P. Yvon. (*J. Pharm. Chim.*, 1910, **1**, 233, 281.) This compound, analogous in constitution to tartar emetic, in which the K is substituted by a molecule of aniline, is introduced as being likely to prove of therapeutic value. Its use is specially indicated in the treatment of sleeping sickness, and other tropical diseases due to blood parasites. For these, it is intended to replace the various arsenical preparations; and it is considered likely to be equally as efficacious as these, if not more so. The secondary effects are much less harmful, and the compound is less toxic than ordinary tartar emetic. A dose of 2½ grains given intravenously is sufficient to cause the disappearance of trypanosomes from the blood. In debilitated cases 1½ grains is sufficient. It acts on the cerebro-spinal fluid more rapidly than atoxyl; two patients overcome by the characteristic somnolence of sleeping sickness ceased to show drowsiness after the administration of 2½ grains of the drug. The best results, however, have been obtained by the alternate administration of aniline emetic and atoxyl. An injection of 1½ grains of this is alternated every five days with one of 8 to 10 grains of atoxyl. The best form of administration is in aqueous solution of 1 c.c. containing 1 *centigramme* of the salt, or if preferred, of such strength that 1 c.c. contains 1 *centigramme* of antimony. The latter is considered to be the preferable basis of dosage. Such a solution is obtained by dissolving 1 *gramme* of the anhydrous salt in water, adjusting the volume to 32 c.c. The salt occurs in two forms, anhydrous and monohydrated; the former separates in long prismatic needles at 15°C.; the latter in larger pale yellow translucid crystals form, at 35°C. Since the hydrated form effloresces readily and consequently varies in strength, only the anhydrous salt, $C_4H_5O_6(SbO)C_6H_7N$, should be used in medicine. Its solutions are stable and are unaffected by sterilizing in the autoclave. Administered by the mouth it acts as an emetic. Aniline tartar

emetic is prepared by dissolving tartaric acid 150, in water 1,000, on the water-bath, adding aniline 93; when combination is complete, antimony protoxide 288, is added, and the mixture is maintained at 100°C. for about an hour, with almost constant agitation. After filtration, the liquid is allowed to crystallize preferably at 35°C. when the anhydrous salt, $C_4H_5O_6(SbO)C_6H_7N$, separates. At ordinary temperatures (15°C.) the crystals contain 1 mol. H_2O. Aqueous solutions of the compound give a violet-red colouration with chlorinated lime solution; a white precipitate with HCl, soluble in slight excess; a white precipitate with HNO_3, soluble in large excess; an orange red precipitate with H_2S soluble in AmHS. The anhydrous salt is soluble in water, 1 : 636 at 15°C., and 1 : 0·567 at 100°. Its solutions are dextro-rotatory.

Arabic Acid Salts of Anaesthetic Bases for Hypodermic Injections. E. Erhardt. (*Nouveaux Remèdes*, 1910, **27**, 209.) The arabates of the anaesthetic bases used for hypodermic administration have the advantage over the corresponding hydrochlorides, of not causing paralysis of the motor function of the nerves. As these salts are gelatinous their resorption is lessened so that even large doses do not occasion toxic symptoms. Moreover, the fall in blood pressure, observed after the use of hydrochlorides, does not occur with the arabates. The duration of the anaesthesia is prolonged threefold. The arabates are obtained by direct combination with the bases, such as cocaine, stovaine, novocaine, and analogous substances, employing an aqueous solution of the acid and an alcoholic solution of the base. After cautious evaporation, the residue is shaken out with ether to remove the uncombined base. The aqueous portion is then evaporated to dryness, again washed with ether, and powdered. Or the acid and base, in molecular proportions, in alcoholic and aqueous solutions respectively, may be evaporated to dryness, directly, and powdered. The preparation of these arabates is subject to a German patent.

Aristolochia Root from Paraguay. (*Gehe's Report*, 1910; *Apoth. Zeit.*, 1910, **25**, 272.) This new drug is much esteemed in South America as a remedy for cholera and snake-bite; it is known as *Mikania guaco* and is referred by Tunmann to *Aristolochia sellowiana* or to *A. macroura.*

Arsacetin for Syphilis. F. S. Lambkin. (*B.M.J.*, **2,**

1909, 380) and H. C. French (*ibid.* 382). Arsacetin has given excellent results by hypodermic injection in the treatment of syphilis as met with in military practice. So great have the advantages of its use already been that it is anticipated that the influence of the drug in shortening the course of the disease will have an important influence on the state of the service. Arsacetin has the great advantage over atoxyl that its solutions are stable, and do not decompose into more highly toxic decomposition products, consequently atrophy of the optic nerve and other ill effects do not follow its use. It is also less toxic and more permanent than soamin. The preparation recommended is a 10 or 15 per cent. aqueous solution. The latter is preferable, since less liquid need be injected for a dose; this has the disadvantage, however, that the salt deposits on cooling, consequently the solution must be warmed before use to redissolve any deposit. Forty minims of the latter is injected every alternate day until the total dose reaches 100 grains. No ill effects have been observed in the course of a year's use. The beneficial effects, especially in the late stages of the disease, are very marked.

Arsenophenylglycin in Ophthalmic Practice. — Grueter. (*J. Pharm. Chim.*, 1909, **30,** 29.) The sodium salt, $COONa{\cdot}CH_2{\cdot}NH{\cdot}C_6H_4{\cdot}As : As{\cdot}C_6H_4{\cdot}NH{\cdot}CH_2COONa$, has given good results when applied externally in the form of a 5 per cent. ointment, in certain ocular affections. It is a yellow powder, readily soluble in water, which is stable as long as it is protected from the air, in sealed tubes. When exposed, however, it becomes altered and gradually turns reddish brown. It should not be used in this condition, since it then occasions irritation.

Arsinosalicylic Acid (*Pharm. Zentralh.*, 1910, **51,** 204) occurs in colourless needles, m.p. 300°C., readily soluble in water. It is less toxic than atoxyl.

Aspirochyl for Syphilis. E. Mameli and G. Ciuffo. (*Nouveaux Remèdes*, 1910, **27,** 276.) Aspirochyl is mercury paraamidophenylarsenate. The authors have prescribed it with advantage, as oily suspensions in liquid paraffin 1 : 20, administered by hypodermic injection. One c.c. was injected every other day until 25 injections had been given; then, after an interval, another series of six to twelve injections. It was also successfully used as an inunction, as a 1 : 20 ointment. Its use may give rise, however, to increased perspiration, tenesmus,

gastralgia or stomatitis. It is prompt in action; but not more rapid than calomel.

Astroline; Antipyrine-methylethylglycollate. E. Winzheimer. (*Pharm. Zeit.*, 1909, **54**, 660.) Astroline, $C_5H_{10}O_3,C_{11}H_{12}ON_2$, m.p. 64°–65·5°C., is a colourless, non-hygroscopic powder, with a slight odour and a pleasant acid taste; soluble in 0·6 part of water at 20°C., in 0·5 part of absolute alcohol, in about 75 parts of ether, and sparingly soluble in petroleum ether. Its aqueous solution should be clear and give an acid reaction with litmus, but be almost neutral with Congo red. It gives a blood-red colour with Fe_2Cl_6; with $NaNO_2$ a green colour is produced without the addition of acetic acid, and the mixture soon deposits green crystals. One Gm. of astrolin should require 6·53 c.c. of N/2 NaOH before giving a red colour with phenolphthalein, this being equivalent to 0·3856 Gm. of methylethylglycollic acid. The liquid after this titration should yield 0·61 to 0·62 Gm. of antipyrine when extracted with three successive 15 c.c. of $CHCl_3$. The aqueous solution left after extracting the antipyrine with $CHCl_3$ should give a yellow colour with Fe_2Cl_6. On liberating the methylethylglycollic acid by means of an excess of H_2SO_4, adding Na_2SO_4 and extracting with Et_2O, the residue obtained on evaporating the Et_2O should consist of colourless crystals, m.p. 71°–72°C., after drying over H_2SO_4. The aqueous solution of these gives a bulky colourless crystalline precipitate with zinc acetate.

Asurol. (*Apoth. Zeit.*, 1909, **24**, 911, 949, 951.) This is a double salt; sodium amido-oxybutyrate mercury salicylate. It forms a yellowish amorphous hygroscopic powder very soluble in water, insoluble in alcohol and in ether. It contains 40 per cent. of Hg in intimate combination, which is not precipitated by alkalies nor by AmHS. It does not precipitate albumin. It causes no irritation on injection, and is relatively non-toxic.

Bismuth Paranucleinate. (*Merck's Report*, 1909, **22**, 148.) This is a yellow odourless powder, also known as "para-bismuth," and claimed to be a compound with nucleinic acid. It is given to young children for chronic intestinal catarrh, in doses of 24 grains in 24 hours. No ill effects were observed with larger doses with children one to two years of age.

Boroform (*Pharm. Zentralh.*, 1910, **51**, 156) is a solution of formaldehyde in sodium glyceroborate. It is a clear, almost

colourless liquid with a faint unpleasant odour. A 3 : 100 solution is used for disinfecting the hands ; and a 1 : 200 solution for washing and sterilizing wounds.

Bromofor (*Pharm. Zeit.*, 1910, **55,** 368) is stated to owe its sedative properties to dibromolaricinolic acid. It is used as a pigment to allay itching and irritation for various skin affections and wounds.

Camphosan. (*Merck's Report*, 1909, **22,** 167.) This is stated to be a 15 per cent. solution of santalol methyl ester in santalol, and is an oil fluid, sp. gr. 0·991 at 18·5°C. (It appears to be closely allied to camphosal, *Y.B.*, **1908,** 229.) It is used in a number of inflammatory affections of the bladder and urethra, and is employed in cases where frequent use of the catheter may incur the danger of infection. The usual dose is 5 grains, in capsules, three to five times daily.

Carbenzyme. — Freund and — Redlich. (*Apoth. Zeit.*, 1910, **25,** 32.) Wood charcoal is found to have the property of fixing trypsin, which is absorbed, but not rendered inactive. The product has been introduced under the above name, for internal administration and also for dressing slowly healing wounds.

Chloro-metacresol as a Hand Disinfectant. Laubenheimer. (*Pharm. Zentralh.*, 1910, **31,** 302.) A 1 : 200 solution of chloro-metacresol in 70 per cent. alcohol is a very powerful bactericide, although its toxic action is slight.

Citarine, Instability of. J. Lorenzen. (*Apoth. Zeit.* **1909,** 455.) Attention is called to the fact that citarine has not a great stability. On keeping, tablets prepared with it evolve a considerable amount of formaldehyde. Administration of the drug which has been kept for some time has been followed by violent vomiting.

Cusol. F. V. Arlt. (*J. Pharm. Chim.*, 1910, **1,** 501.) This name is given to copper citrate made soluble by the addition of 1·2 to 3 per cent. of NaCl and some sodium borocitrate. A 1 per cent. solution is thus easily obtained. Cusol is used in collyria, ointments and powders, is specially useful in ophthalmic work, and is suggested for employment in dermatology.

Dende Root from Sierra Leone. E. H. Holmes. (*Pharm. J.*, 1910, **30,** 26.) The bitter root of a small tree was collected and presented to the Pharmaceutical Society's Museum by Lort Phillips. It is known in Sierra Leone as "Dende," and is employed by the natives as a remedy for malaria. The general appearance of the bark and wood indicated its possible alliance to the Simarubaceae, but until leaves or flowers of the Dende plant are received it will not be possible to identify it.

H. Finnemore has conducted a preliminary examination of a small quantity of the bark, which was extracted in a Soxhlet apparatus with 90 per cent. alcohol, and a portion of the residue after distilling off the alcohol was tested for alkaloid, with negative results, by extraction with dilute acids, filtering, and adding the usual reagents. The remainder of the alcohol extract was treated with pure ether and the solvent removed, when a yellowish-brown semi-crystalline residue was obtained. This was again dissolved in ether, and on allowing the latter to slowly evaporate crystals were obtained and recrystallized from absolute alcohol. These melted indefinitely between 219° and 224°C. This m.p. is higher than that of quassin, which is 210°–211°C. No evidence could be obtained as to their nature, except that they were free from inorganic matter.

Digistrophan. O. Boelke. (*Apoth. Zeit.*, 1910, **25,** 304.) Digitalis 100 Gm., strophanthus 50 Gm., are converted into fluid extract in the usual manner. This is then reduced to a suitable consistence at a temperature not exceeding 40°C., sufficient milk sugar or other excipient is added, and the whole is divided into 1,000 tablets. Each tablet representing 0·1 Gm. of digitalis and 0·05 Gm. of strophanthus, is a convenient dose for use.

Ether Inhalation as an Antidote to Cocaine. J. E. England. (*L'Union pharm.*, 1910, **51,** 212.) The author has frequently used ether inhalations to counteract effects of cocaine and has found it successful even in cases which appeared hopeless. It is much more prompt in action than strychnine given by injection. Ether inhalations stimulate the vaso-motor system and the activity of the respiratory centres and act as a tonic to the cardiac muscle. In all these respects it acts in direct antagonism to cocaine. Care must be taken not to carry the administration too far; it should not exceed a slight degree of narcosis.

The ether should be given drop by drop, otherwise the danger of asphyxia may be increased instead of lessened.

Fenchyval (*Pharm. Zeit.*, 1910 **55,** 568) is fenchyl isovalerianate, an almost colourless liquid; sp. gr. 0·945 at 15°C.; with a slight valerian odour. Given as a nervous sedative.

Frigusin and Bromofor. (*Apoth. Zeit.*, 1910, **25,** 90.) *Frigusin* is an antiseptic application for the skin which forms a varnish which is resistant to both hot and cold water, and which gives off iodine slowly in a non-irritant form. It is stated to be di-iodolarizinolic acid, $C_{20}H_{26}(OH)_2I_2$. Originally introduced as a remedy for frost bite and chilblains, it has acquired a wider application as a general antiseptic dressing.

Bromofor is a similar preparation intended as a sedative skin application, to allay itching, and for erysipelas.

Glidine and Some of its Preparations. (*Pharm. Zentralh.*, 1909, **50,** 417.) *Glidine* is a protein substance, free from nucleinic acid, obtained from wheat and used as the base for a number of drugs. *Arsane* is an arsenic-glidine compound. It is a brown powder, put on the market in tablet form. Each tablet contains 2 *millegrammes* of arsenic. *Bromglidine* is a bromo-compound; a reddish brown powder, partially decomposed by hot water. In tablet form; each tablet containing 0·05 Gm. of Br. *Ferroglidine,* an odourless and tasteless iron compound is decomposed by heat. It is claimed not to occasion constipation. Dose: 4 to 6 tablets each containing 0·025 Gm. of Fe, *per diem. Iodoglidine*: Analogous to the bromo-compound. Prepared in tablets each containing 0·05 Gm. of I. Dose, 3 to 6 tablets a day. *Luesane*: A mercury compound of glidine, a greyish amorphous powder, insoluble in water. Its tablets each contain 1 *centigramme* of Hg, the dose being 2 to 3 *per diem,* for syphilis.

Hectine and Hectargyre. (*Pharm. Zeit.*, 1909, **54,** 727; and *Repertoire,* 1909, **21,** 358.) Hectine is sodium benzosulphonpara-aminophenylarsenate. It occurs in long needles, is readily soluble in water, and is employed as a remedy for syphilis and as a substitute for atoxyl. The dose for an adult is 1 c.c. of a 10 per cent. solution every other day; after 6 days, 1 c.c. every day. When 2 to 3 Gm. have been given the treatment is stopped. If this treatment is inefficacious, the hectine is replaced by

hectargyre, its mercury compound, which is given in the same doses in a similar manner.

Helianthus annuus Flowers, Tincture of, for Pulmonary Affections. (*Merck's Report*, 1909, 22, 337.) Sunflower leaves and flowers are a popular domestic remedy in Russia for affections of the throat, and a tincture prepared from them is used as a remedy for respiratory ailments. G. Beldon prescribes it with other drugs for the treatment of incipient bronchiectasis and in pulmonary gangrene.

Iodglycerol.—Talbot. (*Pharm. Zentralh.* 1910, **51,** 430.) Zinc iodide, 15; water, 10; iodine, 25; glycerin, 50. A disinfectant for painting on the site of operation.

Iothionol (*J. Pharm. Chim.*, 1909, **30,** 215) is a preparation containing 25 per cent of iothion (*Y.B.*, **1904,** 223; **1905,** 197) in the form of a vasoliment. It is intended for veterinary use as a disinfectant and healing application. The parts to be treated are freed from hair, washed with soap and water, then treated with a friction of iothionol in quantities of 15 to 75 grains. The treatment is continued for a fortnight. It has proved most useful in the treatment of periostitis, lympadenitis phlegmons, and other lesions.

Jacandra procera as a Remedial Agent. (*Mercks' Report*, 1909, **22,** 237.) The fluid extract of the root bark of the Brazilian drug is said to be useful for various vesical affections, and also for furunculosis. The drug known as "caroba"; the decoction of the leaves is used in Brazil as a disinfectant wash, also as a gargle and as a powder for ulcers. Internally it is said to be diuretic and antisyphilitic.

Kangalugi Root. H. W. Gadd. (*Pharm. J.*, 1909, **29,** 795.) The root identified as that of *Deinbollea nyikensis* is used by the natives of Africa as a remedy for tick fever, rheumatism, vomiting and as an aphrodisiac. As a remedy for tick bites, the bark is torrified, with some of the insects, on a shovel, and the powdered burnt material is rubbed into scarifications made in the skin. This is claimed to give immunity against tick bites. The root contains a saponin, and is not considered likely to be useful as a drug.

Morphosan.—Hirschlaff. (*Therap. Monats.*, 1909; *Bull. Sci. pharm.*, 1910, **17,** 36.) This name has been given to

morphine bromomethylate. It is stated to be an excellent analgesic and hypnotic, which may be used in the treatment of morphinism, and of infantile epilepsy. Its action resembles that of morphine, but is much less powerful. It may be given to children, by the mouth, in single doses of $\frac{1}{3}$ to $1\frac{2}{3}$ grains, and to adults from $\frac{3}{4}$ to 3 grains, or hypodermically to the latter in doses of $1\frac{1}{4}$ to $3\frac{3}{4}$ grains.

Mucusane. Foelsings. (*Apoth. Zeit.*, 1910, **25**, 295.) It is said to be the zinc salt of ortho-oxybenzoic and boric acid, having the formula—

$\left[\left(\begin{matrix}C_6H_4COO{\cdot}O \\ C_6H_4COOH{\cdot}O\end{matrix}\right)BOH\right]_2Zn$. It is a white, soluble, light, odourless powder. Its solutions are non-toxic and do not stain. A 0·25 to 0·5 : 100 aqueous solution is recommended as a urethral injection for gonorrhoea, and a 1 : 100 solution as a vaginal douche for leucorrhoea. It is also useful for nasal catarrh, empyema, and as a general disinfectant.

Neutralon. A. Alexander. (*Apoth. Zeit.*, 1909, **24**, 930.) This name is given to an aluminium silicate. Although insoluble in water, it is dissolved by the dilute HCl of the gastric secretion. The precipitated SiO_2 is claimed to form a protective layer on the mucous membrane. Neutralon is prescribed in doses of a teaspoonful half an hour before meals for the first day and half a teaspoonful on subsequent days. It is given for gastric ulcer, hyper-acidity and hyper-secretion.

Novocol. (*Apoth. Zeit.*, 1910, **25**, 98.) This is stated to be sodium guaiacol monophosphate, $OCH_3{\cdot}C_6H_4{\cdot}OPO(ONa)_2+2H_2O$. It is a white crystalline powder, soluble in water, and contains 50 per cent. of guaiacol. It is prescribed in all cases where guaiacol is indicated, in doses of 4 to 8 grains, three times daily for adults.

Novoiodine. (*Apoth. Zeit.*, 1910, **25**, 130.) This is a mixture of equal parts of hexamethylene tetramine di-iodide, $C_6H_{12}N_4I_2$, and talc; it is an odourless iodoform substitute.

Nucleinic Acid and its Preparations. (*Merck's Report*, 1909, **22**, 110.) Sodium nucleinate is recognized as a drug stimulating leucocytosis. The value of the acid has led to its compounds being exploited under various names. Thus sterile solution of sodium nucleinate is called "phagocytin"; the calcium

salt "ostauxin"; a compound of iron nucleinate with arsenic is "nucleogen." Phagocytin contains 0·05 Gm. of sodium nucleinate in 1 c.c., which is a dose for hypodermic use. Calcium nucleinate is a white powder, recommended for rickets and scrofula in doses of 8 to 16 grains several times daily. Nucleogen is injected intra-muscularly, in doses of 1 c.c. of a 1 : 10 solution for anaemia, neurasthenia and similar affections.

Orphal. (*Pharm. Zentralh.*, 1910, **51**, 30.) This is β-naphthol bismuth. It is used as an intestinal antiseptic.

Oxysparteine. G. Cohn. (*Pharm. Zentralh.*, 1910, **51**, 400.) Oxysparteine, $C_{15}H_{24}N_2O$, obtained by the oxidation of sparteine, forms white needles, m.p. 83–84°C.; slightly hygroscopic, readily soluble in water. The hydrochloride, $C_{15}H_{24}N_2O \cdot 2HCl$, in broad needles, melts at 48° to 50°C. Oxysparteine increases the pulse, and is prescribed as a cardiac tonic in heart disease.

Pergenol. F. Zernik. (*Apoth. Zeit.*, 1909, **24**, 664.) This is stated to be a mixture of molecular proportions of $NaHC_4H_4O_6$ and $NaBO_3$. The author finds that this statement is correct. Pergenol is described as a solid substitute for H_2O_2. On contact with moisture it liberates H_2O_2 and forms a borotartrate of sodium. It is found to yield 12 per cent. of H_2O_2. It is suitable for general use as a harmless antiseptic, and is prepared in powder form and in tablets. A dentifrice is also prepared.

Peristaltin. (*Pharm. Zentralh.*, 1910, **51**, 66.) This is introduced as an aperient. It is claimed to be a new glucoside, $C_{14}H_{18}O_8$, from Cascara sagrada. It is readily soluble in water and in dilute EtOH; sparingly soluble in strong EtOH; insoluble in Et_2O,C_6H_6, and petroleum ether. The aqueous solutions are faintly acid and reduce Fehling's solution on boiling. Its general reactions are glucosidal. It does not give Borntraeger's reaction, nor does it afford more than a pale yellow colour with AmOH. It gives no volatile anthracene products when distilled with Zn dust.

Picric Acid for Hyperhydrosis of the Feet. Chandèse. (*Merck's Report*, 1909, **22**, 113.) A 5 per cent. alcoholic solution of picric acid is painted on the surface, at first daily, later once a week. After this has dried, the following powder is dusted

on : Picric acid, 5 ; aluminium sulphonaphtholate, 5 ; thymol iodide, 5 ; bismuth subgallate, 30 ; French chalk, 100.

Pinguicula vulgaris, Properties of. (*Gehe's Report*, 1910 ; *Apoth. Zeit.*, 1910, **25**, 272.) The leaves of the butterwort are reputed to have a mild alterative action, and externally, to be healing to wounds. The fluid extract has also been prescribed for whooping cough in conjunction with thyme herb. The leaves contain a ferment which coagulate milk ; but if warm milk is poured on them it becomes thick and keeps sweet, but does not curdle.

Quinine Nucleinate. R. Lenzmann. (*Merck's Report*, 1909, **22**, 283.) Quinine nucleinate is insoluble in water ; it is administered therefore by intra-muscular injection in the form of a 1 : 20 oily injection. Ten c.c. of this is stated to occasion a permanent increase of the leucocytes and to be painless. It is also used alternately with quinine hydrochloride, since the quinine of the nucleinate is only slowly absorbed.

Quinoleine Sulphosalicylate. G. Prunier. (*J. Pharm. Chim.*, 1910, **1**, 538.) This new salt, introduced for medicinal use, is obtained by the interacting of quinoleine and sulphosalicylic acid, in the presence of water, action being aided by the application of gentle heat. The salt, $C_6H_3{\cdot}SO_3H_2{\cdot}OH{\cdot}COOH{\cdot}C_9H_7N{\cdot} + H_2O$, forms white tufts of silky needles ; sparingly soluble in water, 1·547 : 100, at 17°C. ; readily soluble in hot water, almost insoluble in Et_2O and in $CHCl_3$. Its toxic action is less than that of the corresponding quinine salts.

Renine as a Hypotensive. Bengel and Strauss. (*Nouveaux Remèdes*, 1910, **27**, 173.) Renine is the liquid obtained by pressure from kidney tissue, deprived of fat and conjunctive tissue and pulped with fine sand. Renine is not diffusable ; it is not destroyed by digestive action even after a week ; it is precipitated by Am_2SO_4 ; destroyed by heating to 58°C. ; and has the characters of an albuminoid. An injection of 2 c.c. causes a marked increase in the blood pressure in 30 seconds. But after repeated injection, the system acquires tolerance, and ceases to react. Its action resembles that of adrenine, but is weaker.

Salol Chloroform. —Bourlier. (*Pharm. Zentralh.*, 1910, **51**, 173.) The thick syrupy solution of salol in $CHCl_3$ 1 : 1, is

useful for direct application as a disinfectant to wounds; and also for sterilizing laminaria tents. It has a more powerful bactericidal action than iodoform ether, and is odourless.

Sassafras Oil for Ringworm. E. L. Jenkins. (*B.M.J.*, 1910, **1**, 260.) Sassafras oil is well known to be an active parasiticide, and it was in the course of its use, in hospital practice, for pediculosis, that its favourable influence on tinea was noticed. The hair over the infected area is cut short, and the oil was applied twice daily, with a camel-hair brush. No discomfort or irritation is occasioned by the application, and in two or three weeks a growth of fine hair will appear on the bald patches.

Sodium mercuri-amido-oxybutyrosalicate. (*Apoth. Zeit.*, 1909, **24**, 911.) A yellowish amorphous powder readily soluble in water; the aqueous solution is alkaline to litmus, but only slightly so to phenolphthalein. It is not precipitated by heating with alkalies nor affected at the ordinary temperature by AmHS, but blackens on heating or long standing. It gives a white precipitate with acids. As a hypodermic injection, the solution is stated to be painless and non-irritant. It may be prescribed in doses of 1½ to 2½ grains, for syphilis.

Subcutine. — Ritsert. (*Pharm. Zeit.*, 1909, **54**, 25.) Anesthesine sulphocarbolate, introduced under the above name, is claimed to be simultaneously anaesthetic, antiseptic and to be relatively non-toxic. The relative toxic doses of the most used hypodermic anaesthetics per kilo body-weight is given as follows: Cocaine, 0·03 Gm.; alypine, 0·03 to 0·04 Gm.; tropacocaine, 0·06 Gm.; novocaine, 0·2 Gm., and subcutine 1·6 Gm. This low toxicity is partly attributed to the fact that subcutine is eliminated very rapidly. Its antiseptic properties are nearly equal to those of phenol: so that it not only acts as a surgical germicide, but as a preservative to those hypodermic solutions to which it is added to render their injection painless. It is a white crystalline powder; m.p. 195°C.; soluble in water about 1 : 25; readily soluble in glycerin.

Syrgol. Kollbrunner. (*Nouveaux Remèdes*, 1910, **27**, 5.) Syrgol is a combination of colloidal silver oxide with albuminoses. It occurs in fine black scales, readily soluble in water. Possessing very active bactericidal properties, it has been used with success, in the form of an injection, for gonorrhoea.

Tai-tsa ju, a Chinese Snake-bite Remedy. (*Gehe's Report*, 1910; *Apoth. Zeit.*, 1910, 272.) This highly poisonous Loganiaceous plant is used in China internally as an antidote for snake poison and externally as a wash for itching and skin diseases. Tunmann refers it to the genus *Geniostoma*, or *Gardneria*. It is under investigation.

Tangkui Root. E. Lezenius. (*Pharm. Zentralh.*, 1910, **51**, 221.) Tangkui root, esteemed by the Chinese as a remedy for female irregularities, is shown to be derived from an Umbelliferous plant, very closely allied to *Levisticum*. It has been erroneously attributed to *Aralia edulis*. *Eumenol*, the proprietary remedy, is very similar to the fluid extract of Tangkui root, and also closely resembles fluid extract of *Levisticum officinale* root. The paper is illustrated.

Tannin Solution for Ingrowing Toe-nail. P. Miall. (*B.M.J.*, **2**, 1909, 247.) A thick, treacly solution of tannin, made by dissolving tannin, 8, in water, 6, is applied night and morning around the painful toe-nail. If the tannin accumulates, a poultice may be necessary to clean the surface, when the tannin should again be applied. Any case will be cured in two or three days.

Thilaven. R. Knorr. (*Apoth. Zeit.*, 1910, **25**, 323; *Med. Klin.*, **1910**, 669.) This name has been given to the thiozone linalol compound previously described (*Y.B.*, **1909**, 125). It is an aromatic compound containing 0·65 per cent. of organic sulphur as linalyl-acetate-thionozide, and 4 to 4·5 per cent. of inorganic sulphur as alkali thiozonate. It has been used in the form of 5 and 10 per cent. mixtures with glycerin for vaginal use with tampons; and also for dermatological practice. It is prepared by treating essential oils rich in linalyl acetate with thiozone, and dissolving out the compound formed with alkali thiozonate solution.

Trichloracetyl Salicyclic Acid. (*Apoth. Zeit.* 1909, **24**, 781.) As this compound has no acid taste, and has the same therapeutic value as aspirine, it is introduced as a substitute for the latter. It is obtained by the action of trichloracetic acid on salicylic acid, in presence of P_2O_5. It forms colourless crystals, m.p. 150–152°.

Vasotonine, a New Vasodilator. F. Mueller. (*Med. Press*, **1910, 89, 634.**) By combining yohimbine nitrate with urethan

a double salt, vasotonine, has been obtained which has no action on the genital organs or spinal cord, like that exercised by yohimbine alone. When administered in doses of 1 *millegramme* per kilo, body weight, it causes a marked fall in the peripheral blood pressure, while the frequency and depth of the respiration is not influenced. It has the advantage over amyl nitrite and similar remedies of not causing irritation to the vasomotors. If the action should prove to be permanent the remedy would find a large field for employment. Fellner stated that no injurious effect on the heart had been observed to follow the use of vasotonine. It has proved useful for arterio-sclerosis, for angina pectoris and for headaches.

Warts cured by Lime Water. Dudley Kennard. (*B.M.J.*, 1910, **1**, 81.) The daily administration internally of 10 oz. of lime water has cured a case of verruca planis in four days. The patient had over 300 warts on the hands and wrists. These had been treated locally; but even when removed by cautery, were replaced by fresh growths. Other remedies, including $CaCl_2$ internally, had proved useless, although persevered with for long periods.

Xanthoxylum Thunbergianum, var. obtusifolium Root, a Snake-bite Remedy. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 25.) The local name of the plant is "Paardepoam," or mare's teats, on account of the shape of the spines on the stem. J. H. Yeo vouches for the efficacy of the fresh root, in the form of a decoction, ½ oz. of the scrapings to a pint, boiled down to 8 oz. A teaspoonful of this was given every two hours to a child of twelve who had been bitten by a Berg adder and was on the point of death, but who ultimately recovered under the treatment. The first dose occasioned great excitement, after the third or fourth sleep ensued, and the patient ultimately recovered. Since the plant belongs to a genus having marked and definite physiological action, this drug may be worth attention.

Xerase. J. O. Riedel. (*Apoth. Zeit.*, 1910, **25.**) Xerase is a mixture containing dried yeast, 150; bole, 125; sugar, 20; salts, 3. The bole renders it adhesive to the mucous membrane on the surfaces of wounds, so that the yeast may exert its bactericidal action *in situ*. The sugar and salts serve as nutrient media. It is stated to be specially useful in the treatment of gonorrhoea

of the female generative organs, and for dressing foul wounds and inoperable carcinoma.

Zinc-eucerin gelanthum for Intertrigo. P. G. Unna. (*Apoth. Zeit.*, 1910, **25**, 287.) The following mixture is prescribed for genital intertrigo and eczema : Zinc oxide, 2 ; eucerin, 1 ; gelanthum, 1 ; mix. *Gelanthum* is thus prepared : Liquefied gelatin and tragacanth, of each 2·5 Gm. ; glycerin, 5 Gm. ; distilled water, 90 c.c. ; synthetic benzoic acid, 0·3 Gm. ; otto of rose, 1 drop. Mix. The product is a soft white mass easily spread on the skin. It may be quickly dried and rendered waterproof by dusting with a mixture of equal parts of magnesium carbonate and tannin. This forms a permanent covering under which eczema rapidly heals. It is specially useful in the treatment of those parts which may be moistened, when unprotected, by the urine. It is also suggested for use as an application for bed sores.

Zincopyrine. F. Hasse. (*Pharm. Zentralh.*, 1910, **51**, 243.) This compound $(C_{11}H_{12}N_2O)_2ZnCl_2$, crystallizes readily from alcohol in large colourless crystals, m.p. 156°C., soluble in cold water, 5 to 6 : 100 ; and 2 : 5 or more in dilute alcohol. A gauze is prepared for dressing stated to contain 40 per cent. of the double salt ; but this "commercial" statement is said to mean that 100 parts of gauze and 40 parts of zincopyrine give 140 parts of product.

Zincoquinol. F. Fritzsche. (*Apoth. Zeit.*, 1909, **24**, 570.) This is the trade name for zinc oxyquinoline-sulphonate. It is prepared by saturating the acid with ZnO or $ZnCO_3$. It contains 80 per cent. of the salt, and 20 per cent. of ZnO. It is light yellow powder, almost insoluble in water. Being odourless, astringent and antiseptic, it forms one of the many iodoform substitutes introduced as an antiseptic. Zincoquinol should only be employed externally and may be used alone, or diluted with other powders for dusting over wounds ; or it may be applied as an ointment or a paste.

Zirconium Oxide for the Radioscopy of the Digestive Tract. Kolbe. (*L'Union pharm.*, 1910, **51**, 118.) Since zirconium oxide is absolutely non-toxic, it is preferable to bismuth salts, which, when given in the necessarily large doses, have been known to occasion bismuth poisoning. It is also to be preferred to Fe_2O_3, since it is quite tasteless and does not constipate. It

has an intense absorbent power for X-rays, so that it gives a very marked skiagram. The dose is 75 Gm. by the mouth, or 150 to 200 Gm. by rectal injection.

PHARMACOGNOSY

Apricot Kernels as a Substitute for Bitter Almonds. (*Pharm. Zentralh.*, 1910, **51**, 304.) The export trade of apricot kernels from *Prunus armeniaca* from Syria is an important and increasing industry. Two varieties are found, "Misch-misch-lozi," with sweet kernels, which are eaten as a dessert fruit; and "Misch-misch-kelâbi," with bitter kernels. These are the by-products of the manufacture of apricot pulp. In 1906 8,000 sacks of 2 cwt. each were exported from Damascus, and another 2,000 from Mersina. Tripoli and Aleppo also export large quantities. The bulk is sent to Germany, and France; Italy come next, and England last, in the consumption of these kernels.

Apricot, Peach, and Plum Kernels, American, as Sources of Essential and Fixed Oils. F. Rabak. (*Bullet.*, 133, **1908**, *U.S. Department of Agriculture.*) The output of apricot kernels in the State of Calitornia alone is estimated at 5,000 tons, while that of peach kernels amounts to 10,000 tons. At present these are not utilized, or are merely burnt for fuel. It is pointed out that large quantities of two valuable oils are thus wasted. Experiments were made to determine the amount of essential oil obtainable from the various kernels; the following figures, which are only roughly approximate, were obtained: Peach, 0·7 per cent.; apricot, 1·6 per cent.; plum, 0·3 per cent.; bitter almonds, 0·81 per cent. The benzaldehyde present varied from 61·8 to 88·7 per cent., being highest in the oil of plum kernels.

Arnica, False. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 51.) True arnica rhizome has been very scarce, with the usual result that other roots are mixed with it in considerable proportion, in some cases as much as 20 per cent. One of these roots has twice the diameter of the true rhizome, and the transverse section shows a woody centre, with radiating woody wedges and medullary rays of about equal thickness, which at once distinguishes it from arnica. B. Cockburn states that microscopic examination shows the vessels and sieve tubes to contain a yellow oily secretion, which is also present in large oil ducts placed inter-

mediately outside the phloem, as in arnica. Only traces of inulin were observed in the sections examined. Large oblong sclerotic cells are present in the cortex of the false arnica, which afford an easy means of distinguishing it if present in powdered arnica. The odour of the root and the tincture are very similar to that of true arnica.

The characteristics of the two rhizomes in powder may be thus described :—

Arnica montana.—Abundant parenchyma with inulin. Absence of large yellow sclerotic cells. Characteristic thin-walled multicellular brown hairs.

False arnica.—Abundance of wood cells and vessels. Large yellow oblong sclerotic cells. Dark colour of cortical parenchyma and cell contents. Traces only of inulin.

"Breeding" Drug Plants. R. H. True. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 827.) It is suggested that by careful selection of plants rich in alkaloids or in other active principles, a race of plants for drugs might be raised of high and improved medicinal value, just as varieties have been raised for their horticultural value. Conditions of soil and treatment are now being investigated with this end in view.

Camphor from American-grown Trees. R. H. True and S. C. Hood. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 719.) The camphor tree grows well in the United States and is well established in Florida, California, and the Gulf strip. The leaves and young twigs when distilled yield on an average 1·5 per cent. of distillate, consisting of 80 per cent. camphor and 20 per cent. oil. The roots yield a white oil almost without camphor, but strongly resembling oil of sassafras in odour. It is suggested that the trees may be cultivated in the form of hedges, so as to be clipped by machinery, without destroying the plant. An experimental plantation of 60 acres has been started in Florida, planted with seeds of plants showing a high camphor yield. The camphor is separated first by centrifugation, and the oil obtained is then frozen. The results, so far, promise to be remunerative.

Cascara Sagrada, Cultivation of, in U.S.A. R. H. True and G. F. Klugh. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 825.) The threatened shortage of supply from wild trees points to the necessity of cultivation. A series of experimental plantings

have been made in the neighbourhood of Washington, where the trees have reached a height of 10 to 12 feet in six years. These are pollarded, so as to allow systematic gathering of bark without destroying the tree. The yield at present is 600 lb. of dried bark per acre, from six-year-old trees : but this will probably increase. Fluid extracts made from the recently dried cultivated bark were similar in action and effect with similar preparations made from commercial "aged" bark. The preparations of the freshly dried bark did not cause nauseation or griping. Cascara sagrada cultivation would probably prove remunerative.

Castor Oil Seeds, Fijian. (*Bull. Imper. Inst.*, 1909, **7**, 272.) Seeds described as "Mexican variety" were of two kinds: small dark brown and mottled, yielding 47·4 per cent. of oil; and large white mottled with dark brown, yielding 49·6 per cent. of oil. The Hawaiian variety from Fiji, medium sized, dark brown seeds yielded 48·5 per cent. of oil. The average yield of oil from castor oil seeds is from 46 to 53 per cent.

Corozo, a Continental Adulterant of Nux Vomica. G. Planchon and A. Juillet. (*Répert. Pharm.*, 1910, **22**, 97.) The use of "corozo," the ivory nut, *Phytelephas macrocarpa*, rasped or powdered to adulterate nux vomica, has been alluded to previously (*Y.B.*, **1909**, 116). A so-called "Australian corozo" is imported into Hamburg in increasing quantities. This differs in form and structure from the true ivory nut, which is not a native of Australasia. It has, however, a hard kernel of similar ivory-like character. This is now traced as the seed of a Fijian palm, *Metroxylon vitiense*, which also does not grow in Australia. That country is only the intermediate source, importing the nuts from Fiji and re-exporting them to Europe. The nuts are figured and described and their histological structure is discussed.

Cubebs, Variability of Commercial. (*Southalls' Report*, 1909, 11.) Cubebs at present vary greatly in quality. The amount of extractive obtained with petroleum ether, when dried over H_2SO_4, was found to vary from 3·88 to 18·08 per cent.

Chloroxylon swietenia Wood. E. M. Holmes. (*Pharm. J.*, 1909, **29**, 295.) The different reports of those who deal in this wood commercially tend to show that its irritant properties

vary, some woods being irritant and others not so, possibly on account of its containing varying proportions of chloroxylonine.

Delphinum consolida and D. staphysagria Seeds, Microscopy of. C. W. Ballard. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 892.) The histological characters of the two seeds are described and figured. It is stated that several species of Delphinium are used for preparing commercial larkspur seed powder, and that most of the seed on the market is that of *D. ajacis* and not of *D. consolida.* The colour of the powdered seeds is of some value as a diagnostic; stavesacre seed powder is brown, while that of larkspur is greyish black.

Drugs, Crude, Adulteration of Certain, in North American Commerce. J. Moser, junr. (*Amer. J. Pharm.*, 1909, **81**, 576.) *Spigelia.*—Of nine samples of so-called pink root examined, two only were genuine spigelia. One consisted entirely of *Ruellia.* This is easily determined by making a longitudinal section, and noting the cystoliths and stone cells in the cortex. The addition of dilute acid causes a profuse evolution of CO_2 from the cystoliths. Five samples consisted of a root having the general characters of a phlox. The remaining sample consisted of about half of the above root, and half of another having no resemblance to it. (See also *Y.B.*, 1904, 244; **1906,** 110; **1907,** 213.) *Belladonna leaves.*—*Scopola carniolica* leaves have been frequently met with. These are mostly obovate, with an acuminate apex. A cross-section of the midrib shows none of the characteristic hairs of belladonna. (See also *Y.B.*, **1908,** 28; **1909,** 102.) *Wild cherry bark.*—Collectors seem to frequently mistake *Prunus virginiana*, the choke cherry, for the official *P. serotina*, the wild black cherry. As its name shows, the latter has a black fruit, while the former has a red cherry. Both are abundant in the eastern and central United States. Choke cherry bark is in strips of various lengths, 1 to 4 cm. wide and 0·5 to 2 mm. thick; outer surface brownish green, with numerous large lenticels, 0·5 to 1·5 cm. long; inner surface reddish brown, finely striate; fracture fibrous; inner colour white; odour of bitter almond when moistened; taste bitter and astringent. The cross section shows numerous bast fibres, parenchyma containing spherical starch grains 2 to 3 μ in diameter, tannin masses which are coloured brownish by ferric chloride and calcium oxalate in rosette aggregate crystals 20 to 30 μ in diameter. The powder is lighter in colour than that from wild cherry bark,

and is distinguished by its numerous bast fibres, which are 1·5 to 2·5 mm. long, 12 to 20 μ in diameter, lignified and have a thin lumen. (See also *Y.B.*, **1906,** 107; **1909,** 120.)

Frangula frequently has admixed with it or substituted for it the bark of *Rhamnus carniolica.* Five samples were examined. One consisted entirely of *R. carniolica,* one was frangula of U.S.P. quality, and three were mixtures of frangula and *Rhamnus carniolica.* The bark of *Rhamnus carniolica* is usually thicker than frangula, being 1 to 3 mm. thick; the external surface is greyish or greyish brown, usually somewhat wrinkled longitudinally; and with numerous lenticels 1 to 2 mm. long, rather obscure; the inner surface is greyish to dark brown, longitudinally striate from the bast fibres near the surface; the fracture is short-fibrous, the bast fibres frequently projecting 0·5 to 1 cm. from the inner bark; the inner surface is reddened by alkalies as in frangula; the odour is slight, and the taste bitter and astringent. The cross section shows numerous groups of bast fibres occasionally surrounded by crystal fibres with small monoclinic crystals; the medullary rays are 4 to 7 cells wide and there are numerous rosette aggregates of crystals of calcium oxalate, 15 to 25 μ in diameter, in the parenchyma. In *Rhamnus frangula* the bark is thinner, darker brown, with more numerous, prominent, and larger lenticels; the inner surface is more finely striate, there are fewer bast fibres, and the medullary rays are only 2 cells wide; the taste is only slightly bitter. (See also *Y.B.*, **1907,** 211.)

Drugs and Chemicals, Official and Non-official, Quality of, as shipped to U.S.A. A. R. L. Dohme and H. Englehardt. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 713.) From a long list of drugs examined during the year, the following reports are selected as being suggestive. *Aconite root*: All the samples submitted came up to the official requirements. *Aconitine*: One sample of low m.p., 182°C. instead of 195°C., was rejected. *Atoxyl*: Samples are found to vary in amount of water of crystallization. It is suggested that the salt with 5 molecules should be the official one. *Belladonna leaves*: Of 52 samples examined, 9 were deficient in alkaloids. No difficulty was experienced in obtaining the drug containing 0·5 per cent. of total alkaloids. Samples as low as 0·11 to 0·19 per cent. were rejected. *Belladonna root*: Fourteen out of 35 specimens of this root were too low in alkaloidal contents. *Conium leaves*: Every sample

of the drug submitted had to be rejected, the highest amount of conine found being only 0·05 per cent. A drug which is so prone to deterioration should not be used. *Cinchona*: Two samples out of 14 of red bark, and 4 out of 16 of calisaya bark, were rejected for low alkaloidal value. *Colchicum corm*: Two samples out of 15 did not meet the alkaloidal standard of the U.S.P. (0·35 per cent of colchicine). *Colchicum seed*: Twenty out of 25 samples contained less than the U.S.P. amount of colchicine, 0·55 per cent. The lowest only yielded 0·11 per cent. *Camphor*: No synthetic camphor was met with substituting natural camphor. *Ergot*: Only one shipment was unsatisfactory, being physiologically inactive and containing but little "cornutine." *Hyoscyamus*: Three out of 14 samples were deficient in alkaloid. *Ipecacuanha*: Only one sample out of 8 had to be rejected for low alkaloidal value; it assayed 1·94 per cent. of total alkaloids. *Jalap*: Three samples out of 8 were rejected on account of low resin value (U.S.P., 8 per cent.). One shipment assayed 11 per cent. *Methylene blue*: The U.S.P. limit of ash (0·4 per cent.) is too stringent for this colour. Pure samples have given as much as 1 per cent. *Mercury succinimide*: The amount of Hg in this is very variable. Samples have been met with containing only 43 per cent. instead of 50 per cent. *Nux vomica*: Two samples out of 10 were deficient in alkaloids. *Quinine and urea hydrochloride*: The m.p. of several samples, containing the correct proportion of quinine, reached to about 130°C.; the m.p. given in text books is 70 to 75°C. *Saccharin*: It is suggested that the sodium salt should replace saccharin in official recognition; it is more soluble and convenient for pharmaceutical use. *Scopola root*: Only 10 out of 14 samples attained the U.S.P. standard (0·5 per cent.) of total alkaloids. In former years the drug assaying 0·7 per cent. was easily obtainable; now it is very scarce. *Stramonium leaves* were generally good. Only 1 sample out of 9 was deficient in alkaloids.

Echinacea Root, True and False. J. Moser. (*Amer. J. Pharm.*, 1910, **82,** 224.) In the autumn of 1909, a spurious *Echinacea* root was offered on the American drug market. It was possibly derived from *Parthenium integrifolium*, which is said to be collected for the purpose of adulterating the genuine drug. The latter is produced by *Brauneria purpurea* and *B. pallida*. A full description of true *Echinacea*, and its powder,

as well as of the spurious drug in both conditions, is given. *Echinacea* contains 1 per cent. or more of an acrid resin, and is reputed to yield an alkaloid. The taste of the root when chewed is pungent, acrid, and followed by flow of saliva, with tingling sensation and slight numbness. That of the spurious drug is only momentarily pungent, and but slightly bitter and acrid.

Erythrina zeyheri. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 25.) The plant is a native of Orange River Colony. It is a prickly herb having an average height of 18 in. The legumes are acrid to the taste, and contain poisonous principles, but lose these properties when boiled, and can be eaten like "legumes verts." The seeds have a scarlet testa, but do not give up their colour to chloroform. They are used by the Kaffirs in S. Africa for making necklaces. The average weight of the seeds is 20 grains. An analysis of the seeds was made, and they yielded 28 per cent. of a bland nutty flavoured fixed oil, and 4 per cent. of a volatile oil having a pungent odour recalling that of horseradish. E. L. Vrede, who sends a specimen to the Pharmaceutical Society's Museum, gives the particulars as to the chemical constituents of the seeds.

The volatile oil is a powerful irritant. The mixture of the two oils in the natural proportions 28 + 4 speedily causes a pricking sensation when applied to the tongue. The volatile oil is soluble in alcohol and ether, and distils at 140°F. (60°C.). It volatilizes at ordinary temperatures and freely at 65°F. (18°C.).

When extracted by alcohol the seeds yield an alkaloid to the extent of 1·5 per cent. (?), which is insoluble in ether or benzol. $AuCl_3$ gives with it a purple precipitate. A solution of the alkaloid boiled with AmOH or with caustic KOH changes to a sap green colour. A solution boiled with KOH and $CuSO_4$ gives a precipitate of $Cu(OH)_2$ only. It gives the characteristic reaction with Thresh's alkaloidal reagent. Touched with HNO_3, it gives a bright orange colour, changing to red; with H_2SO_4 it gives a dull red, darkening in tint. The name of erythrine is proposed for it. It also gives a characteristic reaction if treated as follows: A solution of the alkaloid is boiled with dilute H_2SO_4 for some time, when erythrinogen is formed, the resulting solution is rendered strongly alkaline with KOH and $CuSO_4$ added. On warming the solution a crimson scarlet precipitate is thrown down. [Probably

due to presence of reducing sugar either occurring, as such, in the seeds, or resulting from the hydrolysis of a glucoside. —ED. *Y.B.*]

Therapeutical Uses.—The fixed oil is aperient, but the oil must be free from volatile oil, or it occasions griping and intestinal pains. The volatile oil is irritant and useful in liniments. The alkaloid appears to be of service in the treatment of scrofula. The fluid extract of the leaf has been used as a blood purifier.

Gentian Root adulterated with Rumex alpinus Rhizome. W. Mitlacher. (*Pharm. Zeit.*, 1909, **54**, 890.) The rhizomes of the Alpine dock, *Rumex alpinus*, have been found as adulterants of gentian root from Bosnia. The adulterant has a superficial resemblance to the dried roots of *Gentiana pannonica*, although closer examination shows numerous differences. The spurious drug has a slightly smoky odour, and an astringent but only faintly bitter taste. The presence of a marked quantity of iron in the *Rumex* rhizome enables it to be readily differentiated from gentian root. Sections of the adulterant, treated first with K_4FeCy_6, and then with dilute HCl, show the characteristic blue reaction for Fe in certain cells. The histological characters also, which are typical, are fully described.

Grindelia camporum, Cultivation of, in Jersey. P. E. F. Perrédès. (*Pharm. J.*, 1909, **29**, 604.) The life history of the plant is recorded and illustrated by drawings and photographs by the author, from germination to seeding.

Indian Hemp, East African. E. M. Holmes. (*Pharm. J.*, 1909, **29**, 132.) Attention is directed to the fact that although the East African drug may yield a good product of extract, its physiological activity is markedly inferior to that of the East Indian drug.

Jaborandi Leaves, False. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 52.) A sample of false "Jaborandi" leaves has been sent to the Museum for identification. In size and general appearance it bears a considerable resemblance to Rio Janeiro jaborandi (*P. pennatifolius*), but the leaves are rather thinner, and have a tea-like odour quite different to the pea-like or leguminous odour of true jaborandi. The oil cells in the leaves are seen to be, not round as in *Rutaceae*, but more or less elongated. They leaves were traced to the

genus *Casearia*, N.O. Samydaceae, but the species could not be determined in the absence of flowers.

Kola Nuts of the Ivory Coast. A. Chevalier. (*Comptes rend.*, 1910, **150,** 623.) The best kola nuts are not yielded by *Kola acuminata*, which has 3 to 5 cotyledons, but by the red kola nut of the Ashantis, *K. astrophora*, or the white kola nut of the Ngans, *K. alba.* Both these two have but two cotyledons. A fourth variety, named *Kola vera* by Schumann, is not a distinct species, but a hybrid of *K. astrophora* and *K. alba.* The last-named is a new species. Although the hybrid is most widely cultivated, it is less esteemed than either of its original parents.

Meum athamanticum as an Adulterant of Fennel. (*Schimmels' Report*, April, **1910,** 70.) The fruits of *Meum athamanticum* are said to be sometimes used to adulterate those of fennel. They may be easily distinguished by their brown colour, the taste resembling that of fenugreek, and by the presence of 3 to 5 vittae between each ridge of the mericarp, while fennel has but one.

Morinda longiflora. E. M. Holmes. (*Pharm. J.*, 1910, **30,** 50.) Under the name of Ojuologbo, the bark and root of this plant have occasionally been sent during the last ten years to the Museum for identification from West Africa, and is regarded as a remedy of some value by the natives. It is stated to be a gentle stimulant to the cerebral centres, acting on the kidneys, and improving digestion and nutrition, and used as a remedy for malaria. The root and leaves of the plant have been examined by Barrowcliff and F. Tutin, who find that it has the following constituents: A yellow substance, melting at 290°C. which is a hydroxymethoxymethylanthraquinone, $C_{16}H_{12}O_4$, crystallizing in yellow needles from absolute alcohol; a substance in pale yellow needles, melting at 209°, which proves to be monomethyl ether of alizarin, identical with that obtained from Chay root (*Oldenlandia umbellata*, Linn.) by Perkin and Hummel, and resin, etc. The leaves yielded a new crystalline alcohol, morindanol, $C_{38}H_{61}\cdot O_3\cdot OH\cdot H_2O$, melting at 278°. Citric acid was found in the root, but not in the leaves. Physiological experiments with extracts of the dried root and leaves upon small dogs yielded no definite effects.

Myrica gale, Pharmacognostical Examination of. E. Perrot. (*Bull. Sci. pharm.*, 1910, **17,** 253.) The examination of the bog myrtle shows that its reputation in Brittany as an abortifacient,

where it is stated to be used for criminal purposes, is fully justified. The active constituents appear to be a resin soluble in alcohol and an essential oil; the resin is a powerful drastic carthartic, and the oil has a paralysant action; the two together appear to be more active than either separately; both are fatally toxic in relatively small doses. The yellowish-green fragrant essential oil, which is yielded to the extent of 0·0443 per cent., has the following characters: a_D $-5°16'$; sp. gr. at 25°C., 0 8984; acid value, 3·48; ester value, 15 5; acetyl value, 50 23. The oil becomes turbid at 5°C., but does not solidify as stated by Geldemeister and Hoffmann; even when cooled to $-17°$, although quite opaque, it is still fluid.

Mustard, Presence of Starch in Immature Seeds of. — Grelot. (*Annales des Falsificat.*; *Repert. pharm.*, 1910, **22,** 15.) The author agrees with Collin that starch may be found in absolutely pure commercial table mustards, since it occurs naturally in the tissue immediately below the sclerenchyma of immature mustard seeds. The amount is small, and never exceeds 1 : 100. Curtel (*Annales des Falsificat.*, **1909,** 215) also states that he has found a minute trace of starch in table mustards of good quality which could not be attributed to adulteration. The amount of starch present may not be sufficient to give a reaction with iodine visible to the naked eye; but it is very evident on using the microscope.

Opium, its Nature, Composition, Preparation, and Methods of Consumption. F. Browne. (*Pharm. J.*, 1910, **30,** 452.) An abstract of a report to the Hongkong Legislative Council, exhaustively dealing with the subject in a manner not adaptable for abstraction. The original article should be read. Of all methods of taking opium, smoking is shown to be by far the least injurious, since only a very small part of the morphine in opium is taken into the system, and even when a comparatively large quantity is burnt the morphine taken internally is excessively minute. The eating and drinking of opium, and of opium wine, the taking of opium pills, and the administration of morphine by injection, are likely to set up the opium habit or craving, and as far as possible facilities for these methods of taking the stimulant should be restricted. Excess in smoking, like excess of any other kind, is also to be discountenanced, but this is in great measure guarded against by the high price of the drug, which, for most people, ensures its consumption in moderate

quantity. But there should be a limit even to the cost of chandoo, for if prohibitive, smokers will resort to the other extremely cheap and admittedly more harmful methods of taking opium, or to cocaine—the very worst form of narcotic indulgence.

Pseudo-Cinchona africana Bark, Characters of. (E. Perrot. (*Bull. Sci. pharm.*, 1910, **17,** 187.) The bark occurs in quilled or curved, almost smooth fragments of various sizes; from 22 to 5 mm. thick; covered with a scaly rhytidome, from which corky flakes are easily detached, and often covered with a whitish crustaceous lichen, which gives the bark a more or less greyish-white appearance; fracture fibrous, somewhat short; internal face smooth and mahogany coloured. The histological characters of the bark are fully described and illustrated. The tree producing the bark is found in different parts of the Ivory Coast. It is about 15 to 20 m. high, and has a trunk with a girth of 15 to 35 cm. The bark is somewhat thin; the wood is compact, yellowish-white, without differentiation of alburnum or heart-wood, and readily split.

Quassia Wood, Exhausted. E. M. Holmes. (*Pharm. J.*, 1910, **30,** 50.) Quassia wood is now largely used for extract for various horticultural spraying liquids. The wood after extraction has been sold as quassia of second quality. A sample of such exhausted quassia was presented to the Museum by V. H. Kirkham, who examined it and found that it was not easy to prove legally that it was exhausted. It was compared with authentic samples from the Museum:—

	1. Museum P.S.	2 Bought.	3. Bought.	4. Exhausted.	5. Bark Genuine.	6. Medulla of Log.
Moisture . . .	9·5	9·7	9·9	13·5	11·2	10·4
Aqueous Ext. .	6·4	8·6	6·3	2·7	2·6	2·3
Chloroformic Ext.	0·7	0·8	—	0·3	0·4	—

It will thus be seen that the exhausted chips contain a larger percentage of moisture, and yield only about one-quarter of the amount of aqueous extract. The difficulty in distinguishing the exhausted from the official drug is that the bark and pith taken from a log in the Museum, about 4 in. in thickness, yielded as little extract and nearly as much moisture as the exhausted

quassia chips. The bark, however, could not possibly be confounded with the chips, and would not pay to collect separately; the medulla forms too small a proportion to be worth consideration. The extract from No. 4 was only slightly bitter, whereas the others were intensely bitter. The quassia had a grey tint due to the presence of dark fungal hyphae, arising from the imperfect drying and probable exposure to the atmosphere.

Quillaia Bark, New Variety of. E. M. Holmes. (*Pharm. J.*, 1910, **30**, 79.) A new form of quillaia bark in quilled pieces has been presented to the museum. It is provisionally referred to *Quillaia poeppigi*. B. Cockburn gives the following distinctive characters of this and the two other commercial forms of quillaia bark.

Official Quillaia Bark.—Strands of bast fibres placed axially. Bast fibres, *not* usually extending from one ray to another. Medullary rays of usually four rows of cells. Lignification confined to the lateral cells of the medullary rays. Starch grains few, 4μ to 6μ in diameter.

False Quillaia Bark.—Strands of bast fibres placed obliquely. Bast fibres usually extending from one medullary ray to another. Isolated fibres not numerous. Medullary rays usually of three rows of cells. Lignification continued, as a rule, to the third cell of the ray.

Quilled Quillaia Bark.—Strands of bast fibres smaller, rarely exceeding fifteen to twenty fibres. Isolated fibres of more frequent occurrences. Starch abundant and larger, 5μ to 15μ in diameter. Medullary rays usually of four rows of cells. Large irregular sclerotic cells in the cortex. Sclerotized cell almost absent in medullary rays. J. C. Umney finds the quilled bark to contain more saponin than the official form.

The powder should therefore be diagnosed by the amount of saponin present, and under the microscope, by the size of the starch grains, the relative abundance of sclerotized cells of the medullary rays, and of the irregular bast fibres, and in the case of the quilled quillaia bark, *Q. poeppigii* (?), by the more pronounced reddish tint.

Quino-quino Balsam from Myroxylon balsamum var. γ-punctatum. C. Hartwich and A. Jama. (*Schweiz. Woch. Chem. Pharm.*, 1909, **47**, 625–630, 641–647.) The quino-quino balsam examined was in reddish-brown irregular pieces, with a pleasant aromatic odour when warmed, like that of Tolu balsam.

When melted and examined with the microscope when cold, it shows numerous crystals. Tolu balsam, Peru balsam, and quino-quino balsam are all yielded by the same tree, but by distinct botanical varieties thereof. *Myroxylon balsamum* (L.) var. *α-genuinum* (Baill.), is the source of Tolu balsam. The variety *β-pereirae* (Baill.) gives Peru balsam. The variety *γ-punctatum* (Baill.) yields quino-quino balsam. The chemical differences of these closely allied products are thus tabulated :—

Myroxylon balsamum.

	Var α-genuinum Tolu Balsam	*Var β-pereirae* Peru Balsam.	*Var. γ-punctatum* Quino-quino Balsam.
Acid value . .	114–158	68–80	8·03
Saponification value	155–187	over 245	134·09
Ester value . .	up to 73	at least 165	53·79
Cinnamein . .	7·5 per cent.	62–64 per cent.	5·83 per cent.
Benzyl benzoate in cinnamein	present in quantity	almost wholly	almost exclusively
Benzyl cinnamate in cinnamein	in small amount	in very small amount	only traces
Vanillin . . .	0·05 per cent.	0·046 ·05 per cent.	0·044 per cent.
Free benzoic acid	only a small amount	none	the greater part
Free cinnamic acid	the greater part	exclusively	in minute quantity
Resin. . . .	80 per cent.	30 per cent.	78·5 per cent.
Free resin alcohol	none	none	at least 5·7 per cent.
Resinotannol .	Tolu-resinotannol $C_{17}H_{18}O_5$	Peru-resinotannol $C_{18}H_{20}O_5$	Tolu-resinotannol $C_{17}H_{18}O_5$
Benzoic acid in resin	small amount	very small amount	all
Cinnamic acid in resin	in predominant quantity	in predominant quantity	none

Snake-bite Remedies, South African, G. E. Oliver. (*Chem. and Drugg.*, 1910, **76,** 780.) An interesting account of plant remedies much esteemed by Kaffirs and Cape whites. Two, *Leonotis ovata* and *Teucrium africanum*, are figured.

PHARMACOLOGY AND THERAPEUTICS

Acetanilide and Antipyrine, Influence of Certain Drugs on the Toxicity of. W. Hall. (*Bull. U.S. Hygienic Lab. No.* **53.**) The direct deleterious effect of acetanilide on the heart is

very imperfectly antagonized by caffeine; in many cases the two drugs administered together produce a greater depression than acetanilide given alone. Caffeine increases the toxicity of acetanilide. Opium alkaloids have a similar effect. Sodium bicarbonate appears to lessen the toxic effect of acetanilide, as do alkalies generally. It is suggested that sodium bicarbonate may be useful as an antidote in cases of acetanilide poisoning. Caffeine and the opium alkaloids should never be prescribed together. In the same way, caffeine increases the toxicity of antipyrine on the heart; but when exhibited to the intact animal this increase of toxicity is only slight and not so marked as in the case of acetanilide.

Acetone and Alcohol for Sterilizing the Skin. O. von Herff. (*L'Union pharm.*, 1910, **51**, 212.) A mixture of equal volumes of alcohol and acetone is said to be one of the best means for the surgical disinfection of the skin, prior to operation. The field of operation is well rubbed for four to six minutes with a piece of sterile flannel freely wetted with the above mixture without any previous washing. After wiping, the site of operation is painted over with the following varnish: Benzoin, dammar, of each 10; thymol, 0·5; ether to make 100, by weight. After evaporation, the thin varnish left is directly incised by the surgeon. After the operation, as soon as the wound is dried, the same varnish is applied to the edges. In cases of vaginal operations, a 0·3 solution of iodine in alcohol is used as a wash. Not one case of serious wound infection has occurred in 280 operations thus conducted.

Adrenine Injection, and Mixture, as a Haemostatic. J. Pruszynski. (*Nouveaux Remèdes*, 1910, **27**, 146.) The injection of 0·4 to 0·5 *millegrammes* of adrenine intravenously, has given excellent results in arresting haemorrhage from the internal organs, especially in pulmonary bleeding. In the latter case the following mixture may be prescribed. Crystalline calcium chloride, 2; solution of adrenine, 1 : 1,000, 3; distilled water to make 200. A tablespoonful to be taken every two hours.

Apiols, and their Substitutes; Suggested Removal of Crystalline Apiol from the French Codex. — Brissemoret, G. Patein and J. Chevalier (*Bull. Sci. pharm.*, 1910, **17**, 98, and J. Chevalier (*ibid.* 128.) Two isomeric apiols are recognized chemically, dill-apiol and parsley apiol. The

latter has been isolated from the fruits of *Petroselinum sativum*, and the former from those of *Anethum sowa* and of *Crithmum maritimum*. Commercially three chief forms of apiol are met with, "green," "yellow," and "distilled" apiol. The original source of all these is the extract obtained by exhausting parsley fruits with alcohol 95 per cent. This semi-solid green mass is known as "parsley butter." "Green apiol" is obtained by first washing the ethereal solution of this with water, to remove apiin and other water-soluble constituents, and then evaporating off the ether. Yellow apiol is obtained when the ether solution is washed with 2 per cent. NaOH solution instead of water. This combines with the chlorophyll and the ether residue is then less markedly green. "Distilled apiol" is obtained by distilling yellow apiol in a current of steam. The serious results which have been sometimes known to follow the administration of apiol are probably due, to a great extent, to the presence of the glucoside apiin. It was considered that the inclusion of crystalline apiol in the French Codex would obviate the danger of the use of these indefinite and sometimes very active products. Since, however, the crystalline apiol of the Codex is practically unobtainable, the reverse has been the case. By treating parsley butter with hot water and animal charcoal, a gelatinous mass is obtained, which, after filtering, cooling, and draining, gives a residue of crystalline aspect, rich in the objectionable apiin, which might be fraudulently substituted for crystalline apiol. It is, therefore, recommended to render official the liquid apiols and not the solid crystalline product. (See also *Y.B.*, **1889,** 40, 41 ; **1890,** 42 ; **1897,** 70, 229 ; **1902,** 34, 161 ; **1908,** 65 ; **1909,** 100.)

Apiols, Commercial, and Essential Oil of Parsley, Physiological Action of. L. Lutz. (*Bull. Sci. pharm.*, 1910, **17,** 7.) The action of crystalline apiol, yellow apiol, white apiolin, and essential oil of parsley fruit have been compared. The toxicity of all the liquid preparations is virtually the same by intravenous injection, approximating 5 c.c. for a dog of 9 to 12 kilos. The crystalline form was not administered in a mortal dose ; but this is above 5 Gm. for a dog of 12·5 kilos. All the apiols and the oil act as vaso-dilators and lessen the arterial pressure. Slowing of the cardiac contractions with increase in their volume, follows the injection of all except white apiolin ; with this the amplitude of the contractions is diminished. With crystalline apiol the depressive action is relatively transient ; it is much more pro-

longed with yellow apiol; white apiolin is the most energetic of all and its period of persistence is longest. The essential oil is the most regular in its action. (See also *Y.B.*, **1905,** 23; **1907,** 187; **1909,** 101.)

Apomorphine and its Derivatives, Pharmacology of. E. Harnack and H. Hildebrandt. (*Apoth. Zeit.*, 1909, **24,** 858; *Archiv. expr. Pharm.*, 1909, **61,** 348.) Although at present it is impossible to separate them chemically, there is no doubt that several apomorphines exist which show notably different pharmacological action on frogs. Dibenzoyl apomorphine, in which the original hydroxyl molecules of apomorphine are eliminated, no longer has emetic properties. Methyl apomorphine bromide (*Y.B.*, **1909,** 108), commercially known as euporphine, has the typical curare action of the amine bases, and it is not emetic; although it still retains intact the hydroxyl molecules, the general paralysing action on the frog is increased. Commercial euporphine contains about 8 per cent. of apomorphine, it is therefore emetic proportional to the amount of this impurity. It cannot be stated at present that it shows any marked advantage over apomorphine as an expectorant for medicinal use.

Arsenium, Metallic Toxicity of. — Lecocq. (*Comptes rend.*, 1910, **150,** 886.) Pure metallic arsenium, free from oxide, has a very low toxic power when administered in the colloidal state by intravenous or hypodermic injection. When animals are treated with the metal below a mortal dose, they rapidly lose weight, become somnolent, then regain their normal condition. Neither convulsions nor dyspnoea are observed, as with the oxides. The lethal dose by hypodermic injection for the guinea pig is 0.0145 Gm.; by intravenous injection for the rabbit, 0.0086 Gm.

Benzoic Acid as a Food Preservative. K. B. Lehmann. (*Merck's Report*, 1909, **22,** 104.) Benzoic acid is considered to be likely to become a powerful competitor to salicylic acid for food preservation. Not only is the former less objectionable than the latter, but it is also a better preservative. Moreover, it has been observed that certain substances preserved with salicylic acid develop in time an odour of phenol. This cannot occur with benzoic acid. The free acid in the proportion of **1 : 1,000** is an active preservative; its salts are less active.

Burns, Bismuth as an Application for, and the General Treatment of. Phillipe. (*L'Union pharm.*, 1910, **51,** 221.) As a rule, blisters should not be pierced. The liquid they contain is sterile and forms the best protection for the surface beneath. The serum should not be let out until the skin beneath is firm enough to resist infection, which will not generally be until the eighth day. Picric acid solution is valuable as a dressing, provided it is not applied too often or too strong. The strength should not exceed 0·6 or 0·8 per cent., and this should be applied once or twice only immediately after the accident. After the picric acid treatment, bismuth subcarbonate or subnitrate should be applied in the form of an ointment or dusting powder. The use of bismuth subcarbonate ointment as a dressing for denuded surfaces of burns or for protecting blisters has been neglected; but it is considered that the bismuth treatment notably increases the chance of recovery in the case of very extensive burns.

Cactus grandiflorus, Value of, as a Heart Stimulant. (*Gehe's Report*, **1910**; *Apoth. Zeit.*, 1910, **25,** 272.) Notwithstanding the unfavourable reports which have been published on the drug, which has been found to be practically inert, it is still claimed that it and its fluid extract are valuable and powerful remedies, the dose of the latter being limited from 10 to 30 drops three or four times daily, in cases of heart disease or nervous trouble. The statement that the drug contains a glucosidal alkaloid is repeated. The disrepute into which it has fallen, and the failure of investigators to find any active principles, is attributed to the fact that *Opuntia ficus-indica* is substituted for the true drug. *Opuntia* is inert. (See also *Y.B.*, **1892,** 155; **1895,** 137; **1898,** 142; **1907,** 189.)

Calcium Chloride to prevent Eruptions after Serum Treatment. A. Netter. (*Bull. Sci. pharm.*, 1910, **17,** 55.) $CaCl_2$ given internally before and during the administration of antidiphtheritic serum prevents or greatly modifies the appearance of a rash. The dose of $CaCl_2$ to be given is 8 grains for every 10 c.c. of serum injected, and 16 grains for 30 c.c. When the patient cannot swallow, it may be administered as a rectal injection. It is not effective for intra-rachidian injections.

Calcium Chloride [to counteract Quinine Intolerance.— Gros. (*L'Union pharm.*, 1909, **50,** 303.) Quinine is often badly

tolerated by those patients to whom it is specially useful. This may be counteracted by the simultaneous administration of $CaCl_2$ in doses of 15 grains *per diem.*

Calomel and Salt Food, Harmlessness of Concurrent Ingestion. Gaucher and Alry. (*Répertoire*, 1909, **21**, 537.) The idea has been prevalent that all salt in the diet should be forbidden when calomel is prescribed, for fear that $HgCl_2$ might be formed. The authors show that this precaution is quite unnecessary; and that there can be no possible danger of any chemical interaction, under the ordinary conditions of diet.

Calomel for Asthma. C. B. Tivy. (*B.M.J.*, 1909, **2**, 882.) Calomel, in the form of a powder or tablet, in doses of ½ to 1 grain, accompanied by one of the usual antispasmodic remedies, is found to be most successful in relieving attacks of asthma. Relief is rapidly obtained, even before purgation takes place.

Camphoric Acid to check Sweating of Phthisis. — Levi. (*Gazz. osped.*; *B.M.J. Epit.*, 1910, **1**, 73.) Camphoric acid in 15 grain doses given twice daily has been found to be the most certain and effective of all the reputed antisudorific drugs. Atropine, sage infusion, calcium phosphate, gallic acid, sodium tellurate were also tried, and frictions with camphorated spirit. Atropine was sometimes effectual, so also was calcium phosphate and sage infusion; but none of these entirely stopped the sweating, except rarely. Camphoric acid only failed in exceptionally bad cases. Frictions with camphorated spirit were a useful aid, but not sufficient alone to stop the sweats. (See also *Y.B.* **1909**, 104.)

Chloral Hydrate as an Anaesthetic Disinfectant. A. Keller (*Nouveaux Remèdes*, 1910, **27**, 214); Siegmund (*ibid.* 215). Keller prescribes chloral hydrate in a 2 per cent. solution, as a spray, for angina and ulcerous stomatitis, and as a 1 per cent. solution for nasal diphtheria and chronic laryngitis. It acts as an antiseptic, deodorant and anaesthetic. Siegmund finds it to be an excellent deodorant in cases of pulmonary gangrene, as a deodorant of sputum, as a mouth wash for fetid breath. For these purposes a 1 to 3 per cent. solution may be used. It is also an excellent deodorant of fetid intestinal or vesical evacuations, and may be used for anatomical preparations.

Chloroform, Decomposition of, in the Animal Organism. M. Nicloux. (*Comptes rend.*, 1910, **150,** 1777.) It has been generally stated in text-books that chloroform is decomposed in the organism with the formation of alkali formate, according to the classic equation of J. B. Dumas,

$$CHCl_3 + 4KOH = 3KCl + HCOOK + 2H_2O.$$

The author fails to find any direct evidence of formates; if they are formed, they are immediately decomposed; since although at least half the $CHCl_3$ administered is decomposed in the organism, only infinitesimal traces of formates are to be found in the urine. On the other hand, there exist abundant evidence of the formation of CO in the organism. Therefore the decomposition probably takes place according to Desgrez's reaction,

$$CHCl_3 + 3KOH = 3KCl + CO + 2H_2O.$$

A small but very distinct amount of CO is evident in the blood of all $CHCl_3$ narcotized animals. The amount, however, is never sufficient to account for the toxic effects of chloroform or for the accidents which sometimes follow anaesthesia. These may be due to the sudden and very marked lowering of the alkalinity of the organism which is shown to occur and which accounts for the great increase in alkali chlorides in the urine of chloroformed animals. It will be noted that the amount of alkali chloride formed is the same in the above two equations.

Colchicine Pills for Gout. (*Merck's Report,* 1909, **22,** 176.) Colchicine, 1 grain; milk sugar, 60 grains; powdered gum acacia, powdered sugar, of each 15 grains; excipient to mass. Divide into 60 pills. Although Becker states that colchicine does not possess the high toxicity generally assumed, it should be prescribed with caution. It is recommended that one of the above pills should be given as early as possible in the course of the attack, to be followed by three more at intervals of 15 minutes, when the patient's constitution is strong. If this does not relieve the pain, one more pill is to be given in 5 hours, and not more than nine in 24 hours.

Crataegus Oxyacantha as a Heart Tonic. T. F. Reilly. (*Journ. Amer. Med. Assoc.*, **1910,** 103; *Pharm. J.*, 1910, **30,** 325.) *Crataegus oxyacantha,* of which the best medicinal preparation is a liquid extract or a tincture, is of use in some of the cardiac neuroses. It is essentially a mild heart tonic. When the

heart is in a weak and irritable condition, following influenza, or in neurasthenia, with a marked arrhythymia of the respiratory type, agents of the digitalis group are almost invariably badly borne, *Crataegus* often acts surprisingly well. It is perfectly safe, and has no poisonous effect. It is best given during or after meals, in doses of from 10 to 30 minims of liquid extract or a fluid drachm of the tincture.

Dental Uses of Essential Oils. D. Gilmour. (*Brit. Dent. J.; Pharm. J.*, 1910, **30,** 644.) *Oil of Cassia* is undoubtedly the most potent of the essential oils as a germicide. Unfortunately, it is the most poisonous upon soft tissues, and because of its irritating effects it should never be used as a dressing for the root canals of teeth. Another objectionable property of this oil is that it causes discolouration of the teeth, which is most difficult to correct. It has been found exceedingly useful in treating severe cases of pyorrhoea, where the pockets are deep and pus is considerable. It may be used full strength. Cassia water is also sometimes of use in treating fistulous abscesses, where it excites a healthy and stimulating action to the tissues.

Oil of Cinnamon.—Its properties resemble those of cassia. As an antiseptic, it is almost equal to oil of cassia. Whilst irritating to the soft tissues and setting up blisters, inflammation, etc., these are not so intense and do not last so long as those caused by oil of cassia. It is also much too irritating to use as a root canal dressing.

Oil of Cloves is one of the best agents for the treatment of pulpless teeth. It has great penetrating power, soaking into the dentinal tubules. It is absolutely non-irritant to the soft tissues, and causes no discolouration of the teeth. It has the power of destroying and making harmless septic and infectious material, and is, perhaps, the best for soothing inflammation in the soft tissues round the apex of the tooth. It has also an anaesthetic action.

Oil of Bay is a perfectly non-irritant and antiseptic agent for root canals, and may prove valuable in some cases.

Oil of Peppermint produces no irritation, inflammation or discolouration. The only objection to its use on the teeth is its strong odour, which is very persistent and penetrating.

Oil of Eucalyptus, *Eucalyptol* or *Cineol* are highly antiseptic and stimulant to the mucous membranes, and have been used for stomatitis in alcoholic solutions. For root canals they are

extremely useful where the pulp has just been removed after devitalization, and where it is wished to keep the canals healthy for a few days before filling properly. They are soothing and perfectly antiseptic, and do not discolour the teeth.

Oil of Thyme has been found to be irritant. *Thymol* dissolved in oil of eucalyptus affords a valuable agent, especially for the treatment of the mild forms of chronic blind abscesses. Eight parts of this in three of alcohol can be diluted to any extent. It is used in deep-seated cavities with great sensitiveness of the dentine. The cavity is filled temporarily with gutta-percha, the mass being touched before insertion with thymol crystals, which, in addition to having an antiseptic action, obtund the sensitive dentine.

Oil of Cajuput is an excellent root canal dressing previous to filling with gutta-percha. Being a solvent of gutta-percha, it causes the latter to adhere to the walls of the canals, thus sealing them up, and this, combined with its antiseptic and non-irritant properties, makes it doubly useful. In placing a temporary stopping in a shallow or saucer-shaped cavity, if the latter be moistened with oil of cajuput, warm gutta-percha will adhere to it with special tenacity.

Oil of Gaultheria is perhaps used in the United States more universally than any other flavouring for tooth-powders, soaps, pastes, and mouth washes. The refreshing and stimulating effects in the mouth seem unattended by any injurious results. As a root canal dressing it is not sufficiently antiseptic to be of any particular use.

Digitalis, Physiological Standardization of. R. R. Hallaway. (*Pharm. J.*, 1909, **29**, 801.) The question is discussed from the point of view of the practising pharmacist.

Drugs, Physiological Standardization of. A. Goodall. (*Pharm. J.*, 1910, **30**, 112.) The methods followed and the general principles involved are clearly explained. The drugs dealt with are strophanthus, digitalis, squill, cannabis indica, suprarenine, and ergot. The original communication should be consulted.

Ergot, Physiological Testing of. J. C. Umney. (*Pharm. J.*, 1909, **29**, 794.) Admitting the importance and value of physiological tests for such drugs as ergot, which do not readily lend themselves to standardization by chemical means, the

author points out the desirability of establishing some definite physiological test for these. Samples of the same batch of freshly prepared liquid extract of ergot were submitted to three expert physiologists. One of these reported adversely on the preparation; the other two considered it to be active. Two of the reports, one favourable, the other unfavourable, were apparently based on the observed rise of blood pressure; the third, favourable, on the action on the uterus.

Eucalyptus Oil, Poisoning with. W. R. Kirkness. *B.M.J.*, 1910, **1**, 261.) Two cases of eucalyptus oil poisoning are recorded. In one, a man, by accident, took two or three teaspoonfuls of the oil, on an empty stomach, in mistake for ammoniated tincture of quinine. In about ten minutes alarming symptoms supervened: vomiting, intense headache, collapse, small pulse and subnormal temperature with dilated pupils. The treatment consisted first of administering a simple emetic, then stimulants and warmth. In the other case, with similar but less severe symptoms, about 1 drachm of the oil was swallowed by a girl when rubbing the gums with it, for toothache. Both cases ultimately recovered; but the first not completely for nearly a fortnight. Eucalyptus oil would seem to affect some more than others. It is stated that doses of 1 to 2 drachms have been taken without ill effects. In some districts mothers are accustomed to give 1 drachm as a dose to their children, for colds. Yet, according to Mitchell Bruce and Hale White, the dose is only $\frac{1}{2}$ to 3 minims. [In view of the widespread use of the oil as a domestic remedy, it would be well for pharmacists to record the dose on the label of all bottles sold by retail. The full medicinal action is obtained by the small doses above indicated, and more is likely to cause, at least, marked digestive disturbances.—Ed. *Y.B.*]

Eucalyptus Oils of the Pharmacopœia. W. J. Brownscombe. (*Chem. and Drugg.*, 1910, **76**, 669.) The author points out that the original oil which Bosisto introduced into medicine, and on which the medicinal reputation of the drug has been established, was not an oil in which cineol was the main constituent, but one which contained notable proportions of phellandrene as well. Recent researches by Dr. Hall on the bacteriological action of eucalyptus oil show also that pure cineol possesses but very feeble antiseptic power, and that phellandrene and piperitone are strongly bactericidal, and are

the constituents which give to eucalyptus oil its valuable therapeutic properties. It would seem advisable, therefore, to discard the purely cineol-containing oils from official recognition, and to include the piperitone phellandrene oils. The oil in almost exclusive use in the Australian States for the past thirty years contains not more than 30 per cent. of eucalyptol, besides phellandrene, piperitone, aromadendral, and pinene, and may be accepted as a typical medicinal oil.

Eulimene. Zickgraf. (*Pharm. Zentralh.*, 1910, **51,** 537.) This is pure limonene introduced as a deodorant for fetid affections of the lungs, as a substitute of pine needle oil and other turpentine products.

First Aid in Sulphuric and Nitric Acid Burns. (*Chem. Trade Journ.*, 1909, **45,** 358.) Acid burns are sometimes very deceptive as to their severity, especially those from HNO_3. The burn is apt to be made light of at first, but in a few days a red line, denoting inflammation, begins to form round the yellowish patch, following which separation of the slough commences, which takes a considerable time and leaves a raw, granulating surface, slow in healing. If it is not carefully attended to, so as to keep the granulation down, it will leave a prominent scar and permanent disfigurement. In all cases of severe burns, either from HNO_3 or H_2SO_4, the patient should at once be plunged into a tank of $NaHCO_3$ solution ; then the part should be thoroughly bathed with pure warm water, afterwards applying a cloth saturated with oil, and then covering with cotton wool and a bandage. The patient should be taken at once to his home or to an hospital. Then commences the proper treatment of the burn, which is suitable for both HNO_3 and H_2SO_4 burns. A piece of lint saturated with carron oil is applied, the smooth surface of the lint being placed to the part, and is covered with oiled silk or gutta tissue, cotton wool or gamgee and absorbent bandage. This dressing should be changed night and morning for the first few days, but should the burn be very severe and painful, then a thin piece of cotton cloth saturated with carron oil, and a warm bread-and-water poultice are applied, covered as before with wool or gamgee and a bandage. The poultices should be renewed at least two or three times in the twenty-four hours, and continued until the separation of the slough, when the carron oil and tissue dressings are reverted to, as at first. Should the burn become irritable and slow in healing,

then carbolic oil, boric lint, or the following paste may be tried, according as is found suitable. Paste—composed of equal parts, by weight, of carron oil and zinc oxide ointment. Should the granulations become exuberant or above the level of the surrounding skin, they should be painted over with a 2 per cent. solution of cocaine, before being touched, every second day, with a solution of $AgNO_3$ (15 to 20 grs. to the ounce of distilled water), or with solid lunar caustic, afterwards being dressed with carbolic or carron oil, as before.

Acid Burns of Eyes.—Acid burns of the eyes should on no account be bathed with alkaline solutions, but at once and liberally with pure warm water, or warm water and milk, allowing the fluid to run freely over the eyeballs. Afterwards a few drops of a 2 per cent. solution of cocaine hydrochloride, slightly warmed, are applied, then a little pure castor oil, and lastly, a piece of lint saturated with warm water is placed over the eye and held there by means of a light bandage. This can be repeated two or three times a day. Cocaine alkaloid dissolved in castor oil is sometimes used, but the first method is best. A 2 per cent. ointment of cocaine hydrochloride and vaseline applied to the eyelids affords great relief, and should be applied at bed-time. In using the cocaine solution, a good plan is to warm a teaspoon in hot water, thus making the application more agreeable to the injured eye. This treatment should be continued for a few days, but the after treatment must depend entirely upon the severity of the burn.

Formaldehyde Solution unreliable as a Disinfectant Wash of Rooms. — Ciaccia. (*Presse méd.*; *J. Pharm. Chim. Append.*, 1910, **1**, 38.) Even strong solutions of formaldehyde will not destroy the tubercle bacillus in sputum dried on the walls of a room, when applied as a wash. Painted walls may be disinfected from other germs by its means, and even resistant spores are destroyed after three hours. Whitewashed walls require a longer period and stronger solutions. Distempered walls, where much size is mixed with the colour, are still more difficult to disinfect in this way. Formaldehyde solutions are not, therefore, to be recommended for room disinfection by means of a wash.

Glycerin and Castor Oil as a Laxative. (*Formulary of Nouveaux Remèdes*, 1910, **27**, [7].) Glycerin and castor oil mixed in equal proportions forms a more efficacious and more pleasant

purgative than castor oil alone. A drachm of each is, in many cases, sufficient for a laxative; and more acts as a purgative.

Haemorrhoids, Bleeding, Unna's Ointment for. (*Formulary of Nouveaux Remèdes*, 1910, **27** [4], 2.) Chrysarobin, 8; iodoform, 3; green extract of belladonna, 6; vaseline, 150.

Iodine for Burns. Descomps. (*L'Union pharm.*, 1910, **51,** 9.) The active antiseptic action of iodine renders it a valuable application to prevent infection of burns. For this purpose the tincture is useful, since it can generally be obtained quickly when other powerful antiseptics are not available. After removing all dirt from the zone surrounding the burn, the unburnt adjacent parts are freely painted with the tincture. On the burnt area itself the application should be made gradually, and the zones where great pain is caused may be treated with a more dilute application. If a very extensive surface has to be treated, general anaesthesia may be necessary. After the application, dry aseptic dressing should be used. Subsequently only the peripheral zone should be painted with iodine; only points showing signs of infection on the burn itself should be touched if necessary.

Lactic Acid for Inoperable Cancer. J. Efimow. (*Merck's Report*, **1909**, 22, 109.) Daily dressing with 0·25 to 1 per cent. solution of lactic acid, and the internal administration of a tablespoonful of 1 : 45 solution three times a day, have given excellent results in a case in inoperable carcinoma of the lip.

Local Anaesthetics, Comparative Value of. J. Chevalier· (*Bull Sci. pharm.*, 1909, **16,** 518.) As the result of comparative tests, and considering their general properties, stovaine and novocaine are considered the best local anaesthetics for general use, also cocaine, which will always be popular, in spite of its toxicity and marked vaso-constrictor action. It is difficult to determine the relative value of stovaine and novocaine. Among surgeons stovaine is generally preferred, especially for important operations and medullary anaesthesia. On the other hand, dentists prefer novocaine, which can be effectively combined with adrenine. Alypine is irritant; β-eucaine is too toxic, and anaesthesine too insoluble.

Mercurial Injections, Use of Sugar in. Desmoulières and Lafay. (*L'Union pharm.*, 1910, **51,** 8.) It is found that

the addition of sugar to injections of mercurial salts renders them as painless as if cocaine had been added, without the obvious defects of that anaesthetic. Two formulae given are: (1) Freshly prepared mercury benzoate, 1 Gm.; pure sodium chloride, 1 Gm.; pure cane sugar, 10 Gm.; sterilized distilled water to make 100 c.c. (2) Freshly prepared mercuric iodide, 1 Gm.; pure sodium iodide, 1 Gm.; pure cane sugar, 10 Gm.; sterilized distilled water to make 100 c.c. These solutions cannot be sterilized by heat. If necessary, they must be filtered through a porcelain candle.

Methylene Blue, Suppression of the Blue Colour of the Urine with. H. Monigault. (*Bull. Comm.*, **37**, 373.) If tincture of iodine be applied externally in the region of the spinal column while methylene blue is being administered, the familiar persistent blue colouration of the urine will not occur. If, however, the urine be heated so as to drive off the iodine, the blue tint becomes evident. This proves that iodine is absorbed when applied to the skin, a fact on which doubt has been sometimes thrown.

Pancreatic Secretion, Action of, on Glycerides. L. Morel and E. Terroine. (*Comptes rend. Soc. biolog.*, 1909, **272**; *Bull. Soc. Chim.*, 1910, **7**, 112.) The action of the pancreatic secretion on triglycerides of the saturated fatty acids, increases with the molecular weight of the triglyceride, from triacetin up to trilaurin, then again decreases, until it becomes very slight for the triglycerides generally met with in foods. With mono- or di-glycerides the rate of action decreases very markedly in passing from tri- to di-acetins, and again from di- to mono-acetins. Therefore the intermediate products of pancreatic hydrolysis become more and more stable as the action proceeds.

Pharmacological Assay of Heart Tonics. E. M. Houghton and H. C. Hamilton. (*Pharm. J.*, 1909, **29**, 473, 504.) Since the chemical assay of the heart tonics of the digitalis series is so unreliable, some method of pharmacological assay must be adopted in order to safeguard the therapeutic application of these products.

For the fluid extract of digitalis and the fluid extract of squill, U.S.P., 8th Revision, no standard can be given, since the menstrua proposed for these products do not completely exhaust the drug.

A heart tonic unit (H.T.U.) might be adopted which is equivalent to ten times the normal minimum fatal dose (M.F.D.) per gramme body weight of standard test frogs kept under proper test conditions. The standard of physiological activity should be equal to the average value of the given preparation, determined at the season of the year when the most uniform results may be obtained, best established, as in the case of the standards proposed, by comparison of the results obtained during several years' testing.

It is recommended that the number of heart tonic units per c.c. be placed on the label of each preparation at the time it is tested and finished for placing on the market; also the date of manufacture.

The authors realize that it may be possible and desirable, with added knowledge as the result of laboratory experiments, to improve the method of assay proposed. It is believed, however, that strict adherence to the method of assay and proper labelling as outlined will result in more uniformly active products of this class, as they appear on the market, and safeguard their therapeutic use. Data obtained in the course of original investigation extending over a period of fifteen years, including results recorded with digitalis, squill, convallaria, and strophanthus, are given.

Pyrogallol Ointment for Lupus. F. Veiel. (*Merck's Report*, 1909, **22**, 114.) A 10 per cent. vaseline-pyrogallol ointment is first applied to the surface, for several days, until vesication occurs; then weaker ointments are applied. For this purpose a 2 per cent. strength is recommended and continued until all appearance of lupus has gone and only red granulations remain. The strength of the ointment is then gradually reduced until only 0·1 per cent. is used. In some cases even this very weak ointment prevents the formation of epithelium. In these, healing is promoted by the use of plain vaseline alone.

Quinine Dermatitis. W. Gripper. (*B.M.J.*, **2**, 1909, 17.) Extreme intolerance of quinine has been shown in the case recorded in which a dose of a teaspoonful of a proprietary article, containing less than $\frac{1}{4}$ grain in the drachm, produced most unpleasant symptoms. In the hope of establishing tolerance the administration of smaller doses was continued, but produced a rash, with intense irritation, followed by swelling of the extremities and subsequent desquamation. The same

patient experienced most unpleasant symptoms after taking salicylates.

Santonin, Method of Administering. (*Schweiz. Woch. Chem. Pharm.*, 1910, **48**, 94.) In the evening, at bedtime, the patient should be given the following potion, which should be repeated on the empty stomach the next morning: One clove of garlic cut up and gently boiled in a small cupful of milk for ten minutes, then strained through a cloth; sweetened to taste, and taken warm. This preliminary treatment renders the parasites more susceptible to the santonin, and diminishes the capacity of absorption of the stomach for the drug. The santonin is generally given in doses of $\frac{1}{6}$ grain for every year of the patient's age, up to 5 grains. It is dissolved in oil of sweet almonds, 5 Gm. This is then emulsified with syrup of gum acacia, 20 Gm.; orange flower water, 20 Gm., forming a pleasant flavoured emulsion which is to be taken in three portions, at five minutes' interval. Two hours afterwards a calomel purge is given. It is stated that thus administered, the santonin is not absorbed at all by the stomach.

Soy Flour and Gluten for Diabetic Bread. J. Chevalier. (*Bull. Gén. de Thérapeut.*, 1909, **157**, 845.) By employing a mixture of fat-free soy meal with gluten, a bread quite free from all sugar-forming constituents may be obtained, which has the great advantage of closely resembling ordinary bread, both in flavour and consistence. The fat of the soy bean, *Glycine hispida*, is nauseous and indigestible. This has rendered the use of soy meal, originally suggested by Dujardin Beaumetz for the preparation of "diabetic" bread, generally unpopular. By removing this fat, however, a meal is obtained which is eminently suitable for the use of patients suffering from diabetes. Its composition is: Moisture, 13·1; albuminoids, 47·65; fat, 4·4; carbohydrates, 12·9; cellulose, 3·85; ash, 5·36 per cent. The addition of gluten, which is necessary to produce a bread of the desired texture and consistence, gives a finished product, having the composition: Moisture, 35·5; albuminoids, 37·75; carbohydrates, 17·6; fat, 1·15; cellulose, 2·2; ash, 2·8. This differs markedly in taste and texture from the gluten breads usually employed, and when masticated does not form a rubber-like mass.

Strophanthin, Relative Toxicity of, by Different Methods of

Administration. J. Pédibidou. (*Comptes rend.*, 1909, **149**, 306.) Strophanthin is much more toxic by intravenous injection than by buccal administration, or even by intra-muscular injection. Tolerance is always shown by the two latter methods, even of ultra-therapeutic doses which may be repeated indefinitely. But intravenous injection causes sudden death with infinitesimal doses. This method of administering should never be resorted to.

Suprarenine, Laevo- and Dextro-, Comparative Physiological Action of. E. Abderhalden and F. Thies. (*Nouveaux Remèdes*, 1909, **26**, 372.) Dextro-suprarenine, when applied to the pupil of the frog's eye, produces no mydriasis; laevo-suprarenine in similar doses produces a marked and characteristic dilatation. Any slight action in this respect that dextro-suprarenine may show is due to the presence of a trace of the laevogyre form. Similarly, dextro-suprarenine fails to produce glycosuria when administered in such doses as cause a marked excretion of sugar in the case of laevo-suprarenine.

Sulphites, Effect of, used as Preservatives. K. B. Lehmann and A. Trentlein. (*Archiv. Hygiene*, 1909, 303; *Nouveaux Remèdes*, 1909, **26**, 320.) As the result of experiments on cats and dogs, it would appear that the prolonged ingestion of minute quantities of sulphites is followed by no appreciable disturbance of the health. Doses of Na_2SO_3, ranging from 15 to 62 Mgm. per kilo body-weight, continued daily for 200 days, had no apparent effect, and did not cause the faintest indication of renal lesion. The animal organism can, therefore, oxidize such amounts of sulphites without harm. The use of sulphites should not, however, be permitted, in the author's opinion, since their use disguises the appearance of incipient decomposition, and allows inferior materials to be used in the preparation of dietetic articles.

Veratrum Album, Blistering Action of Green Seeds of. L. Reinhard. (*Pharm. Zeit.*, 1909, **54**, 852.) Although the veratrums are known to be markedly irritant when taken internally or when acting on the mucous membrane, that mere handling of the green seeds may be followed by unpleasant symptoms does not appear to have been recorded. A case has occurred in which, after handling the seeds, the finger-tips at first smarted and ultimately developed very painful blisters,

resembling those produced by burns. A few days afterwards the patient was feverish and showed small blisters on the tongue and the gums. A cure followed in eight days under appropriate treatment.

PHARMACY

DISPENSING

Ampullae and their Uses. C. A. Mayo. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 1106.) The making, filling and general manipulation of ampuls is fully described. The paper is profusely illustrated.

Bismuth Subnitrate, Hydrolysis of, in Mixtures. H. A. B. Dunning. (*Drugg. Circ.*, 1909, **53**, 331.) The amount of acid liberated from bismuth subnitrate in presence of water may be very considerable. A prescription for 150 grains of $BiONO_3$ in 5 ounces of peppermint water, after standing ten days, was found to contain free acid equivalent to 20 minims of dilute HNO_3 in each teaspoonful, and a considerable quantity of bismuth in solution. Subsequent experiments showed that this liberation of acid was progressive, and was much greater with some brands of $BiONO_3$ than with others. It was less in the presence of peppermint water than in plain water. Hydrolysis is noted to be more rapid at higher temperatures, and contact with the air also accelerates the decomposition. Of the four brands of bismuth subnitrate examined, one, which was the " dense " form, generated acid much more rapidly than the other three, which were the " bulky " form. It is considered possible that some of the cases of bismuth poisoning recorded may be due to the presence of soluble bismuth nitrate in bismuth mixtures which have undergone this decomposition. It is suggested that it may be advisable to discard the subnitrate of bismuth for medicinal use and substitute the hydrated oxide or the oxycarbonate.

Bitter Almond Water, Precipitation of Alkaloidal Solutions with. T. M. Litterscheid. (*Apoth. Zeit.*, 1910, **25**.) Barillé (*Y.B.* **1905**, 243) showed that cherry-laurel water may cause precipitation with alkaloidal salts. The author finds the same

to occur with bitter almond water. This is due to the formation of NH_3 by the decomposition of the HCN. This probably forms a condensation product with the benzaldehyde. It is known that HCN, in aqueous solution, undergoes change with the production of ammonium formate. In the case of bitter almond water, the impurity which precipitates alkaloids may be removed by shaking each litre of the water with a few Gm. of animal charcoal, filtering after a few hours' contact.

Caffeine Phenazone Powder. Bulnheim. (*Pharm. Zeit.*, 1910, **55**, 353.) Citric acid (dried over H_2SO_4), 1; caffeine, 9; phenazone, 90, are rubbed together to a fine powder. A substitute for migrainine.

Chrysarobin and Pyrogallol Ointments, Alkaline. —Dreuw. (*Pharm. Zentralh.*, 1910, **51**, 414; *Monats. prakt. Derm.*) The antiseptic, reducing and general effectiveness of these ointments are markedly increased by the presence of alkali. For this purpose the use of soft soap is recommended, a typical prescription being: Salicylic acid, 10; chrysarobin, 20; soft soap, 25; anhydrous wool-fat to make 100. This ointment is best dispensed in collapsible tubes, since this prevents loss of reducing power by oxidation from contact with the air, such as is unavoidable when the preparation is put up in the ordinary ointment pot.

Cinchona Alkaloids and their Salts, Solubility of, in Water. G. L. Schaefer. (*Amer. J. Pharm.*, 1910, **82**, 175.) The following are the amounts of water required to dissolve one part of the alkaloids of cinchona bark or their salts at a temperature of 25°C., the solution being saturated at that temperature for several days. Quinine alkaloid, 3,000; acetate, 50; anisol, 2,400; arsenate, 650; benzoate, 360; bihydrobromide, 5; bihydrochloride, 0·7; bihydrochloride with urea, 1; bisulphate, 8·5; chlorhydrosulphate, 1·3; chromate, 3,150; citrate, 825; glycerophosphate, basic, 850; hydrobromide, 43; hydrochloride, 21; hydroferrocyanide, 2,000; hydroiodide, 205; hypophosphite, 35; lactate, basic, 6; nitrate, 70; oxalate, 1,400; phosphate, 800; picrate, 3,400; quinate, 3·5; salicylate, 2,100; sulphate, 700; bisulpho-guaiacolate (guaiaquin), 0·5; sulpho-phenate, 250; urate, 550; phenol sulphate, 680; tartrate, 950; tannate, 2,000; valerate, 80. Cinchonidine alkaloid, 4,800; bisulphate, 1; tetrasulphate, 3; bihydrobromide, 7; hydrobromide, 60;

hydrochloride, 21; bihydrochloride, 1·6; salicylate, 1,320; sulphate, 92; tannate, 1,800. Cinchonine alkaloid, 8,800; bisulphate, 1·5; hydrochloride, 22; hydrobromide, 59; bihydrobromide, 1·8; salicylate (cryst.), 590; sulphate, 85; tannate, 1,100; tartrate, 32. Quinidine alkaloid, 6,900; hydrobromide, 190; hydrochloride, 86; hydroiodide, 1,220; salicylate, 1,650; sulphate, 95; tannate, 2,100; tartrate, 35; bitartrate, 310.

Cocaine Hydrochloride and Chloroform Water, Apparent Incompatibility of. V. Zotier. (*L'Union pharm.*, 1910, **50**, 398.) If chloroform water be made with ordinary tap water, it will not give a clear solution with cocaine hydrochloride. The $CaCO_3$ present will liberate a portion of the alkaloid, which gives a turbidity with the $CHCl_3$ in the water. If the chloroform water be made with distilled water, there will be no turbidity.

Corrosive Sublimate Ampoules for preparing Disinfecting Solutions. — Abey. (*Répertoire*, 1909, **21**, 346.) Ampoules of corrosive sublimate in strong solution are preferable to either powders or tablets. The latter are specially dangerous as they are likely to be mistaken for harmless confectionery, especially by young children. The solution recommended consists of $HgCl_2$, 12 Gm.; NaCl, 12 Gm.; $CuSO_4$, 2·4 Gm.; HCl, 2·4 Gm.; indigo carmine q.s. to colour; distilled water to make 48 c.c. Each ampoule of 2 c.c. will contain 0·5 Gm. of HgCl. The $CuCl_2$ formed is a useful deodorant disinfectant; the HCl maintains the perfect brightness of the solution, and the indigo-carmine gives a distinctive and warning colour. For use, the end of the ampoule is filed off and the contents poured into water, then suitably diluted.

Crayons, Uterine. (*Formulary of Bullet. Sci. pharm.*, 1910, **17**, 58.) The following formulæ are claimed to be, at the same time, supple and resistant as required for uterine application. *Phenosalyl*: Rye flour, 30; gum acacia, 15; phenosalyl, 1 : 50 solution in glycerin, 15. *Compound antiseptic*: Andyhrous copper sulphate, 7; iodoform, 7; ichthyol, 3; rye flour, 10; gum tragacanth, 5; cocaine hydrochloride, 0·5; glycerin, about 15. *Strong copper sulphate*: Anhydrous copper sulphate, 20; rye flour, 15; gum tragacanth, 5; glycerin, about 15. *Weak copper sulphate*: Anhydrous copper sulphate, 5; rye flour, 15; tragacanth, 5; glycerin, about 10. *Iodoform*: Iodoform,

powdered, 40; gum acacia, 10; gum tragacanth, 10; rye flour, 20; glycerin, about 30. *Iodoform and ichthyol*: As above by substituting ichthyol 15 for the same weight of glycerin. The glycerin is added in sufficient quantity to form a supple mass. This is rolled into crayons from 5 to 6 cms. long and 3 to 4 mm. thick. These are then slightly dried in the stove, so as to render them flexible, but not brittle. *Zinc chloride*: Zinc chloride, 1; rye flour, 2 or 3. Mix the chloride with the flour and leave in contact with the air until it forms a sufficiently soft mass when worked. Then roll and dry to the required consistence. Preserve in well closed tubes.

Ethyl Nitrite and Potassium Chlorate Mixture with Digalen, Incompatibility of. D. McEwan. (*Pharm. J.*, 1910, **30**, 404.) The following mixture has been dispensed and found to contain incompatibles: Potassii Chloratis, ʒii; Digalen, ʒii; Spirit. Aetheris Nit., ʒii; Tinct Card. Co., ʒii; Aquam, ad ℥vi; Misce. When dispensed the mixture is clear, and has the pinkish-red colour of the cochineal of the compound tincture of cardamoms. In about twenty minutes the cochineal colour has entirely disappeared, and there remains a yellowish-brown muddy mixture, which gradually deposits a yellowish-brown precipitate, the supernatant liquid being bleached almost water-white. It was found that by first neutralizing the sweet spirit of nitre with $KHCO_3$ the bleaching effect was retarded, taking thirty-five minutes instead of twenty minutes with the ordinary sweet spirit of nitre. The official solution of ethyl nitrite produced the same bleaching effect as the sweet spirit of nitre.

There also separates out a number of thin, sharp-edged tabular crystals of $KClO_3$. The separation of these is due to the alcohol present. $KClO_3$ is found to be very markedly less soluble in dilute alcohol than in water. This remarkable influence of alcohol in diminishing the solvent action of water on potassium chlorate is of general interest to dispensers. The odour and flavour of the spices was also found to disappear. The brownish precipitate was traced chiefly to the cinnamon, and was almost entirely eliminated by using the modified tincture of cardamoms of McCutcheon (*Y.B.*, **1906**, 137).

The bleaching and loss of odour were found not to occur if the spirit of nitre and $KClO_3$ solution were mixed and allowed to stand for 4 hours before adding the tincture. But even then the ethyl nitrite is oxidized into nitrate. The glucosidal digalen

is also probably decomposed, so that the only ingredient in the mixture retaining its therapeutic activity would be the $KClO_3$.

Glutubes, Glutin Capsules for Administering Drugs. Darasse and Dupont. (*Répertoire*, 1910, **22**, 49.) Cylindrical metallic moulds, with rounded ends, are covered with a lubricant powder, then with powdered glutin; the surface is then moistened, when the glutin aggregates, and forms an impermeable covering. When dry, this is cut in half. Two containers are thus obtained from each mould. Another series, slightly larger, is then made. These serve as covers. The smaller containers are filled with the drug in powder, or in liquid form, by means of small funnels. If in a dry, bulky condition, the material may be packed with a small wooden rammer. The larger cover is then slipped on and the edges, when moistened with water, are perfectly sealed in a few seconds. These tubules may be conveniently made of three sizes to contain 0·4 c.c., 0·75 c.c., and 1 c.c.

Hydriodic Acid Mixture, Dispensing Difficulty with. J. Tait. (*Pharm. J.*, 1910, **30**, 406.) The following mixture has given trouble: Potass. Iodid, ʒii; Acid. Hydrobrom. dil., ʒiv; Aquam Chloroformi, ad ℥vi; Misce.

In a short time the solution becomes yellow from decomposition of the HI—resulting from the reaction between the KI and HBr. The decomposition proceeds till the mixture assumes a dark brown colour. The irritant action of this free iodine would be most objectionable. As the above mixture appears to be in somewhat common use at the present time, the difficulty is of some practical importance. It is analogous to that dealt with in a previous communication (*Y.B.*, **1905**, 136), where the presence of dilute sulphuric acid in a mixture containing potassium iodide and also quinine caused considerable trouble. In that case the difficulty was overcome by the addition of a small quantity of sodium hypophosphite. The same expedient was found to be successful in the present instance, this addition enabling a permanently colourless mixture to be dispensed when as little as ½ grain of sodium hypophosphite was added to each fl. oz. of mixture.

Incompatible Mixture containing Spirit of Ether. H. Lucas. (*Pharm. J.*, 1910, **30**, 106.) On dispensing the following mixture a yellow colouration was immediately developed, which after

several hours disappeared, and a fine crystalline precipitate fell to the bottom of the bottle, whilst a strong odour of iodoform developed. Ammon. Carb., ʒii ; Pot. Iodid, ʒi ; Spt. Etheris, ʒii ; Aq. Chlorof., ad ℥vi. The yellow colour was proved to be due to free iodine, and the precipitate to be iodoform. The liberation of the iodine from the KI was traced to the spirit. etheris. Ether has the well-known power of absorbing oxygen from the air, and converting any little quantity of water present into H_2O_2, and this peroxide was the source of the trouble. The production of H_2O_2 in spirit of ether seems to be much greater than in ether itself. A satisfactory mixture was obtainable by the following slight deviation from the original prescription: Dissolve the salts in recently boiled and cooled water (distilled); make the ʒii spirit. etheris freshly by dissolving 40 mins. of pure ether in 80 mins. of 90 per cent. alcohol; dissolve in this the requisite quantity of chloroform to make the chloroform water; add to the well-diluted saline solution, and make up to bulk with the sterilized water. By this means no iodine is developed, no iodoform precipitated, and no odour thereof able to be detected after standing in the light for over a fortnight. The expediency of retaining spirit of ether in the B.P., seeing its proneness to alteration, is questioned.

Phenazone and Caffeine Citrate, Cause of Colouration of Mixtures of. T. Wilson. (*Pharm. J.*, **1909,** 804.) Mixtures containing phenazone and caffeine citrate have been observed to give a yellow colour, more pronounced in the presence of AmBr. This is traced to the reaction between a minute quantity of iron present in the citric acid of the citrate and the phenazone. By substituting caffeine alkaloid for its citrate, a colourless solution is obtained. The presence of phenazone greatly increases the solubility of alkaloidal caffeine in water. In the presence of 80 grains, 32 grains of caffeine dissolve and remain permanently in solution in 2 fluid ounces of a mixture. (See also *Y.B.*, **1890,** 51.)

Pills of Potassium Iodide or Mercuric Iodide. Goevarts. (*Nat. Drugg.*, 1910, **40,** 171.) The following method gives a satisfactory pill. For one pill take of potassium iodide, 0·20 Gm.; starch, 0·04 Gm.; powdered gum arabic, 0·08 Gm.; calcined magnesia, 0·10 Gm.; the powders are thoroughly mixed and massed by adding sufficient of the following mixture: Glycerin, 2 parts; syrup, 5 parts; alcohol, 3 parts. The pills

if made in bulk, must be kept in a thoroughly dry place. They disintegrate completely in water and undergo no decomposition. Pills of mercuric iodide may be prepared in the same way.

Pills, Sodium Cacodylate. E. O. Rowland. (*Pharm. J.*, 1909, **29**, 711.) Sodii cacodylatis, 3 grains; pulv. tragacanth, 1 grain; pulv. sacch. alb., 2 grains; tritici farinae, 6 grains; divide in pil. 12. The object of the sugar is to form a syrup with the moisture present. Its value is evident if an attempt is made to mass with the flour alone. The mixed ingredients are worked vigorously together for a few minutes, then rolled and rounded with a very little French chalk. The pills are white, and retain their shape well, without going damp.

Resorcin, Borax, and Corrosive Sublimate, Compounding a Solution of. P. Helsmoortel. (*L'Union pharm.*, 1909, **50**, 451.) The following prescription had to be dispensed: Resorcin, 1 Gm.; $HgCl_2$, 0·25 Gm.; Borax, 2 Gm.; water, 300 c.c. The incompatibility of the borax and $HgCl_2$ was not modified by the addition of the resorcin after mixing the two former. The precipitate formed was not redissolved. But on dissolving the borax and resorcin together, and adding the $HgCl_2$ previously dissolved in a little water, a clear solution was obtained showing a slight deposit after standing for two days.

GALENICAL PHARMACY

Acacia Mucilage. A. W. Bromley. (*Pharm. J.*, 1909, **29**, 6.) The least troublesome method of straining mucilage of acacia is to force it through the muslin by the pressure produced by the expansion of air in the bottle. Dissolve a quantity in a wide-mouthed bottle so large that the gum and water only half fill it; a 4 oz. quinine bottle will do well for the B.P. quantity. When dissolved remove the cork and cover the bottle-mouth with muslin very firmly tied, and stand the bottle in the coolest possible place for half an hour or so. Then invert the bottle in a measure or jug, and put the whole in a warm place. The confined air within the bottle, expanding, will force out part of the mucilage. When the process stops the bottle must be set upright in a cool place again, and when quite cold again inverted in the measure. In winter the difference in temperature between the open air and near a kitchen stove is enough to empty a bottle with two warmings, and sometimes with one only. In

summer the difference between a cool cellar and a sunny window is sufficient to accomplish the straining in two or three warmings.

Alypin Lubricant for Urethral Anaesthesia. (*Pharm. Zentralh.*, 1910, **51,** 537.) Tragacanth, 13; glycerin, 36; mercury oxycyanide, 1; distilled water, 370; alypin, 21.

Ammoniated Tincture of Quinine, Assay of. J. Haycock. (*Pharm. J.*, 1910, **30,** 570.) The proportion of alkaloid, free and combined ammonia are determined volumetrically with N/10 HCl with cochineal indicator. One hundred c.c. of the B.P. tincture should yield quinia equivalent to 1·9807 Gm. of quinine sulphate; and 0·9112 Gm. of free ammonia. A polarimetric method for determining the alkaloid, first converted into sulphate, is also given.

Anthrasol Preparations. (*Pharm. Zentralh.*, 1910, **51,** 113.) *Anthrasol zinc paste*: Anthrasol, 1; lanoline, 2; zinc oxide, 4; starch, 4. *Anthrasol glycerin ointment*: Anthrasol, 1; lanoline, 1; glycerin ointment to make 10. *Anthrasol dusting powder*: Anthrasol, 1; zinc oxide, 10; French chalk, 10. *Anthrasol hair wash*: Anthrasol, 3; mercuric chloride, 0·15; resorcin, 2; glycerin, 25; spirit of lavender, 100. *Anthrasol-lenigallol paste*: Anthrasol, 3; lenigallol, 5; zinc paste to 50. *Anthrasol Wilkinson's ointment*: Anthrasol, 2; sulphur, 2; soft soap, 2; glycerin, 2; vaseline, 3; lanoline, 3. *Anthrasol bath mixture*: Anthrasol, 25; resin, 10; melt and add alcoholic potash solution (1 : 10), 10. Make an emulsion. (See also *Y.B.*, **1904,** 261; **1907,** 223.)

Atoxyl Solutions and their Sterilization. G. Candussio. (*Pharm. Zeit.*, 1909, **54,** 891.) Atoxyl solutions should never be sterilized by heating, not even by tyndalizing for 7 hours at 70°C. In cases of emergency they may be heated, for two minutes only, to 100°C. But in all cases cold sterilization by filtration through porcelain is preferable. The previously sterilized containers should be filled at once, *in vacuo*. Only crystallized atoxyl which has been stored in non-actinic orange glass bottles should be used. All solutions which have acquired a pale yellow colour should be rejected as unfit for use. The pharmacist should assume no responsibility as to the keeping properties of atoxyl solutions. All solutions of atoxyl become decomposed in time; those that have been sterilized by heat give no indication of this change by showing a yellow colour.

The cold sterilized solutions, on the contrary, show a yellow tint, which warns that decomposition has commenced.

Aristol Preparations for Antiseptic Dressings. F. Daxenberger. (*Merck's Report*, 1909, **22,** 131.) *Aristol oil*: A 10 per cent. oily solution of aristol is a useful non-irritant antiseptic dressing for general use. *Aristol paste*: Aristol, 5; mucilage of acacia, 10; glycerin, 10; bole q.s. to make a paste of the desired consistence. *Aristol dusting powder*: Aristol, 1; powdered boric acid, 2. Mix. For adults a mixture of equal parts may be used.

Assay Methods of the U.S.P. A. R. L. Dohme and H. Engelhardt. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 899.) The official processes of the U.S.P. are considered in detail. Those for *aconite*, *cinchona*, *colchicum*, *conium*, *hydrastis* and *jalap*, *nux vomica*, *opium*, are criticized or commented on, with suggested modifications. Those for *belladonna*, *coca*, *guarana*, *ipecacuanha*, *physostigma* and *pilocarpus* are commended. It is suggested that official processes should be given for the quantitative testing of *kola*, *cantharides*, *saffron*, *malt extract*, *thyroid gland*, and *strophanthus*.

Bismuth Subnitrate Suspensions for Fistula. E. G. Beck. (*Merck's Report*, 1909, **22,** 149.) These bismuth suspensions, used primarily to enable the course of fistulae to be delineated by radiography, were found to be themselves of such healing power that the fistulae soon closed under their influence. Bismuth subnitrate, 30; white vaseline, 60; liquid paraffin, wax, of each 5.

Borax Wax Ointment, Gibele's. (*Pharm. Zentralh.*, 1910, **51,** 4.) Olive oil, 60; yellow wax, 30; boric acid, 10; silver nitrate, 1. Used to stimulate granulation in contused wounds and burns.

Cacao and Chocolate in Pharmacy. W. R. White. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 1014.) The use of cacao powder and sugar is advocated as an excellent means for covering the taste of drugs to be administered in powder form. It may also be used as a flavour for emulsions, as follows: *Chocolate flavoured cod liver oil emulsion*: Peppermint oil, 2 minims; cod liver oil, 1 fl. oz.; powdered acacia, 3 drachms; powdered cacao, 2 dr.; alcohol, 96 minims; saccharin, ½ grain; lime water to make 2 fl. oz.

Dissolve the cacao in the lime water by heating for ten minutes, cool and make a mucilage by adding 2 dr. of this solution to the acacia. Then add the oil in small portions, triturating until it is emulsified. Then gradually add the rest of the solution; lastly, the peppermint dissolved in the alcohol; (and the saccharin). This makes a very thick emulsion; by using less acacia, it may be made thinner. *Chocolate flavoured castor oil emulsion*: Castor oil, 2 fl. oz.; powdered acacia, 6 dr.; powdered tragacanth, 16 grains; oil of peppermint, 3 minims; saccharin, 4 grains; glycerin, 192 minims; cacao powder, 2 dr.; distilled water to make 4 fl. oz. The cacao is dissolved in the glycerin and water by boiling for five minutes. A mucilage is made by rubbing down the gums with 4 dr. of this. The mixed oils are then gradually added and emulsified, the remainder of the cacao solution (and the saccharin).

Caffeine Sodium Salicylate. G. Mossler. (*Zeitsch. d. allgem. Apoth. Verein.*, 1910, **141**.) Caffeine sodium salicylate is prepared by dissolving a mixture of equal weights of caffeine and sodium salicylate in water and evaporating to dryness; it forms a white, odourless, amorphous powder, with bitter-sweet taste, soluble in water (1 in 2) and in alcohol (1 in 50), the water solution being neutral in reaction.

Calcium Creosote Solution. L. Kolipinski. (*Med. Bull.*; *Lancet*, 1909, **177**, 974.) Slaked lime, 5 parts; creosote, 1 part, are rubbed together, and the resulting purplish-red substance is percolated with distilled water so as to obtain a solution having the sp. gr. 1·011. This will measure about 20 fluid parts. Each fluid dr. contains about 3 drops of creosote. The solution has a smart peppery taste, but it does not exert an irritating or caustic action on the tegumentary membranes. A suitable dose for an infant of one year is from three to five drops in water every two or three hours. For a child of six to eight years doses of one teaspoonful may be given, and for an adult from one to two dessertspoonfuls in a glass of water. As much as 6 fl. oz. of the solution had been administered during the day without protest or any unpleasant symptoms. It is not necessary, however, to give more than a dessertspoonful in cases of acute disease. The use of solution of calcium creosote is recommended in a variety of conditions, such as pneumonia and enteric fever. It may be found useful in various systemic affections and local

pathological conditions, and it deserves a trial as a topical application in dermatological practice.

Calomel, Hypodermic Oily Injection of. Boileau. *Bull. Soc. Pharm. Bordeaux.*; *Répert. Pharm.*, 1910, **22,** 7.) The calomel employed should first be washed with water, then with EtOH and finally with Et_2O. An excipient is prepared with vaseline oil, 3; and anhydrous lanoline, 7. Of this 86·65 Gm. is taken and mixed in a mortar with 40 Gm. of HgCl. The 100 c.c. of mixture thus obtained contains 0·040 Gm. of HgCl in each c.c. The mixture may be sterilized at 120–130° in an autoclave; as the liquid cools it must be agitated to suspend the HgCl until the temperature reaches 30°C. It should be kept separate in small quantities not exceeding 10 c.c. at the most. (See also *Y.B.*, **1908,** 267.)

Camphor, Rapidity of Volatilization of. C. H. La Wall. (*Amer. J. Pharm.*, 1909, **81,** 545.) Lump camphor, exposed in a large dust-free cupboard lost 1·56 per cent. of its weight in 24 hours; 8·74 per cent. in 4 days; 23·46 per cent. in 14 days; 43·34 per cent. in 28 days; and 61·95 per cent. in 45 days. Powdered camphor, similarly exposed, lost 8·8 per cent. in 24 hours; 33·3 per cent. in 4 days; 83·7 per cent. in 14 days; and 99·9 per cent. in 20 days. Liniment of camphor containing the official percentage, 20 per cent., of camphor, after being exposed in an uncorked bottle at an almost constant temperature of 40°C. for 14 days, contained 19·75 per cent. of camphor; and after one month 19·21 per cent. Another portion similarly exposed at ordinary room temperature lost less than 0·25 per cent. of camphor in a month. Spirit of camphor, when exposed in uncorked bottles, gains in its camphor content, the volatilization of the alcohol being more rapid than that of the camphor. A sample of this spirit containing 10 Gm. of camphor in 100 c.c., gave 11·47 Gm. in that volume after 14 days' exposure, and 12·04 Gm. after one month.

Carbolic Acid, Liquefied, with Alcohol. (*Pharm. Zeit.*, 1910, **55,** 213.) Phenol, 5; liquefied by the addition of alcohol 90 per cent., 1, gives a liquid carbolic acid preferable in every way to that made by adding water. It keeps free from colour, is miscible in all proportions with oils, and it does not solidify at low temperatures.

Castor Oil, Aromatic. F. W. Nitardy. (*Mid. Drugg.*,

1910, **44,** 44.) Saccharin, 3 Gm.; oil of anise, 12 c.c.; alcohol, 75 c.c.; castor oil, a sufficient quantity to make 1,000 c.c. Dissolve the saccharin in the alcohol by aid of gentle heat, mix with about 800 c.c. of castor oil, and add oil of anise and castor oil q.s. to make 1,000 c.c.

Castor Oil in Powder Form prepared with Magnesia. O. B. May. (*J.S.C.I.*, **1909,** 28, 826.) Castor oil may be mixed with MgO without in the least affecting its properties. The castor oil magnesia powder contains 50 per cent. of the oil, and is stable, tasteless, odourless, readily taken, and well borne. Its therapeutical efficacy is as great as the same dose of pure castor oil, and the magnesia contributes its own properties to the powder. The use of magnesia as an excipient to convert liquids into dry or semi-dry substances is not new. The U.S. Pharmacopœia of 1890 contains a preparation—the *Massa copaibae*—which was prepared by heating magnesia, water, and copaiba balsam until a plastic mass was obtained. On using more magnesia than the formula prescribes a copaiba powder would result. It is furthermore known that with glycerin, sugar, and starch, magnesia forms solid masses, which can be reduced to powder. In all these cases, however, the magnesia combines chemically with the substances with which it is mixed. In the castor oil powder the oil is in no way changed, that is to say, castor oil powder is not a magnesia soap of castor oil. No glycerin or free fatty acids (except those present in the original oil) can be found, as would be the case if saponification had taken place. On extracting the castor oil powder with ether in the Soxhlet apparatus from 96 to 98 per cent. of the entire fat content may be recovered. The fact that not all of the oil is thus extracted at first gave rise to the thought that at least a part of the oil was saponified. To settle this question the powder was rubbed up with water and enough hydrochloric acid added to decompose the magnesia. The resultant liquid was then shaken out with ether. In this way all the oil incorporated was recovered. The examination of the oil extracted in the Soxhlet apparatus or extracted after decomposition of the powder with acid differed only in the one point, that the acid value of the former was zero; all other constants were the same as those of the original oil. On mixing the castor oil with magnesia, the free fatty acids present in the oil are neutralized, forming minute quantities

of magnesia soap, which acts as a kind of catalytic agent, emulsifying the balance of the oil and distributing it very thoroughly. On drying the paste formed by mixing castor oil, magnesia, and water, the oil globules do not unite again, but remain in the state of the original fine subdivision.

Cascara Sagrada, Characters of Fluid Extract of. L. Kroeber. (*Apoth. Zeit.*, 1910, **25,** 158; *Pharm. Praxis*, 1910, [1]; *Schweiz. Woch.*, 1910, **48,** 377.) When mixed with water, 1 : 10, liquid extract of cascara should give a yellowish brown, never a coffee or chocolate brown, precipitate. Sp. gr. (of the Ph.G. IV preparation), 1·060 to 1·070 at 15°C., never under 1·050. It should not contain less than 20 per cent. of dry extractive, of which the ash should not exceed 1·2 per cent. If 1 c.c. of the fluid extract be diluted with 1 c.c. of water and shaken out with 10 c.c. of Et_2O; when 5 c.c. of the clear yellow Et_2O solution is drawn off and shaken with a few drops of AmOH and 5 c.c. of water, the aqueous layer should be coloured deep cherry-red. The filtrate from a mixture of 1 c.c. of extract with 9 c.c. of water gives a marked turbidity with solutions of tannin, $HgCl_2$, Fe_2Cl_6, ammonium molybdate, and acetic acid, and on standing a precipitate. The filtrate from *Rhammus frangula* extract similarly diluted gives no precipitate. If 3 c.c. of the above filtrate be diluted with 6 c.c. of water, and treated with 0·1 c.c. of a 1 : 5 solution of $HgCl_2$, cascara sagrada extract still gives a turbidity and after a time, a bulky yellowish precipitate, whereas *Rhammus frangula* extract gives no reaction.

Catgut, Formalin-Iodine. J. Steward. (*B.M.J.*, 1909, 2, 932.) Skeins of ordinary formalin catgut, immersed for 10 days in a 1 per cent. aqueous solution of iodine, afford the most satisfactory material for surgical sutures. At the commencement of the operation, one of these skeins is placed in 1 : 20 phenol solution, which removes excess of iodine, that might possibly cause irritation. Catgut prepared in this manner does not swell inconveniently, nor become too elastic, as raw catgut sterilized by immersion in alcohol and water does. This formalin-iodine catgut is very strong and resistant, so that too rapid absorption does not occur. It is very smooth, uniform in diameter, and inelastic, therefore easy to manipulate. Owing to its tensile strength and its resistance to absorption, fine sizes can be used. For skin sutures No. 000,000 is employed; this does not become absorbed for 8 or 10 days if the wound be dry;

it therefore lasts long enough to ensure firm union, but does not require removal, and the stitch-holes soon disappear. For intestinal work No. 00 has given satisfaction. For muscles, aponeuroses, and tendons, Nos. 1 and 2 are used. These sizes are not absorbed for quite a month. Catgut thus prepared is preferable to that which has undergone more complicated processes, and the method is one which can be conveniently carried out by the surgeon. The finer sizes are apt to become somewhat brittle if kept for several months in the iodine solution.

Catgut, Iodized. F. Edge. (*B.M.J.*, 1910, **1**, 320.) Catgut is macerated in Et_2O for 24 hours to remove fat. It is then boiled for 1 hour in absolute EtOH. After this, it is macerated for 7 days in a mixture of liniment of iodine, 1 ; and water, 11. Finally it is kept in, and used from, a mixture of liniment of iodine 1, and rectified spirit 49. Catgut must be boiled.

Catgut, Dry Iodine. W. S. Dickie. (*Brit. Med. Journ.*, 1910, **1**, 134.) A great disadvantage attending the use of iodine catgut prepared in the wet way is the brittleness which speedily develops when the gut lies in the iodine solution for more than ten or fourteen days; the surface of the material sometimes also becomes rough and uneven. The author has adopted the dry method of A. v. Moschowitz. This is to wrap special glass slides, with notches cut at the ends, in a piece of gauze, and subject them to sterilization. One length of catgut is then wound loosely on each slide, a certain amount of "slack" being necessary, as the catgut contracts so much in the solution. The loaded slides are placed in the sterilizing jar, and an excess of iodine solution poured over them, the jar being provided with a ground-glass cover, and stored in a dark place. On the tenth day the iodine solution is poured off, the gut drained as much as possible, and the slides then transferred to sterile glass tubes. A few dozen of these test tubes, each plugged with cotton-wool with a layer of gamgee tissue above and below the tubes, are placed in a copper vessel; the whole is sterilized in a high-pressure steam sterilizer for half an hour, and then placed in a gas oven to ensure perfect dryness of the tubes and wool plugs. The loaded slides are then placed in the tubes, the cotton-wool plugs immediately replaced after a preliminary singeing. The covering layer of gamgee tissue is placed over the tubes, the lid put on, and the tin put away upside down for a couple of

days to allow any remaining moisture to be absorbed by the plugs. At the end of that time the catgut is perfectly dry.

Catgut, Sterilization of, in Vaseline. Lerat. (*Répertoire*, 1910, **22**, 219.) Brown, not defatted catgut, is immersed in a tube filled with vaseline previously sterilized by heating to 200°C. The tube is then immersed in a saturated boiling solution of sodium chloride and borax and kept at about 104°C. for an hour. The boiling for this time is repeated on three successive days. The gut is thus perfectly sterilized and is kept in the tube. When required for use, the vaseline is melted, the gut withdrawn and freed from vaseline by simply wiping with aseptic gauze.

Catgut, Surgical, Preparation of. R. R. Bennett. (*Pharm. J.*, 1910, **30**, 389.) The following modification of Lister's method is advocated. *Solution No.* 1: Mercuric chloride, 2 Gm.; distilled water, 400 c.c. *Solution No.* 2: Chromic anhydride, 4 Gm.; distilled water, 300 c.c.

To solution No. 2 add sufficient H_2SO_3 to turn the reddish-brown colour of the chromic acid solution into a bright green solution of chromic sulphate, and finally add enough distilled water to make up the measure to 500 c.c. Care must be taken not to add an excess of H_2SO_3, and the solution should have no odour of SO_2.

Solutions Nos. 1 and 2 are next mixed together, and the liquid is ready for the catgut.

Lister suggests that at least twenty parts by weight of the preparing liquid should be used for every one part by weight of catgut; in practice it is found convenient to exceed this limit. The strands of catgut should be first washed, then wound loosely upon glass reels or plates. Fluted glass reels are very useful, but not essential. The catgut is now kept in the mixture for 24 hours, after which it is taken out and dried on the stretch. It must be carefully handled, as soaking makes it soft, and the surface is easily roughened. A convenient and satisfactory way of drying the gut is to unwind it carefully and hold each strand at arm's length, letting it first untwist the kinks by its own weight. Next, tie one end of the strand round a long length of glass rod or tubing, the two ends of which rest horizontally on two supports. The strand is then threaded through the centre of the glass reel on which it has been wound during immersion in the liquid (so as to weight each strand), and the other end is

tied to another length of glass rod placed at a convenient distance from the first, and similarly resting on two supports. If small glass reels are used for stretching the finer strands, and the ordinary sized reels of about 1¾ inches diameter for stretching the thicker strands; the dry gut should present a smooth and uniform surface, but if too great a tension is employed during the drying process the surface of the gut will be fluted and uneven. The gut thus prepared can be kept dry in hanks, and will remain antiseptic for an almost indefinite period. Since the dry surface is liable to come into contact with septic material, Lister suggests that the gut should be put into a 5 per cent. solution of phenol a quarter of an hour or so before the operation is begun.

Iodized catgut is prepared by macerating the gut wound on glass reels in an aqueous solution containing 1 per cent. of I and the same amount of KI. The gut is kept in this solution for 10 days at least before use, and is usually stored in the solution in which it is prepared. A solution of 1 per cent. of iodine in benzol, or of 2 per cent. of iodine in acetone, has also been suggested. Formalin induces some change in the substance of the gut, and after treatment it can be sterilized by boiling in water without being destroyed. The gut is wound on glass reels as usual, and is immersed in a 3 per cent. solution of formaldehyde for 12 to 48 hours, according to the thickness, then carefully washed in a stream of cold water, and afterwards boiled in water for fifteen minutes before use. Formalin catgut may also be immersed in a 1 per cent. aqueous solution of I with KI for 10 days before use; this is said to be stronger and more resistant than that sterilized in boiling water.

Cherry Laurel Water, Further Notes on. E. Léger. (*J. Pharm. Chim.*, 1910, **1**, 606.) The results of previous investigations by the author and others are thus summarized. (1) The leaves do not give constant figures for HCN and essential oil at all periods of the year. (2) But since the yield of HCN is always above the official requirements, the water may be distilled at any time. (3) In May and June, the buds and young leaves give a richer product than is obtained from older leaves. (4) The water loses a part of its HCN when kept, even if stored in full, glass stoppered vessels. (5) In corked bottles, partially filled, although this loss is at first rapid, it ultimately becomes very slight. (6) Cherry laurel water should be reduced to the official strength only as required for use. Vaudin has found

that when kept in black bottles in a cellar, the water does not vary materially in strength. Bourquelot and Malmajec indicate that the presence of micro-organisms affects the stability of the water. Bourgault points out that benzaldeyhde appears to be responsible for the precipitate caused by cherry laurel water with certain alkaloidal solutions. (See also *Y.B.*, **1905,** 243; **1908,** 271; **1909,** 137.)

Cod-Liver Oil Emulsion; Ph. Ital. (*Chem. and Drugg.*, 1910, **76,** 583.) Cod-liver oil, 1,000 Gm.; gum acacia powder, 10 Gm.; tragacanth powder, 10 Gm.; isinglass, 2 Gm.; calcium hypophosphite, 5 Gm.; sodium hypophosphite, 5 Gm.; saccharin, 0·2 Gm.; cinnamon oil, 4 drops; alcohol, 90 per cent., 50 Gm.; orange-flower water, 40 Gm.; water, 878 Gm. Add the oil to the two gums, then make an emulsion by the addition of the isinglass dissolved in 700 c.c. of water. Dissolve the hypophosphites and the saccharin in the remaining 178 c.c. of water and the orange-flower water, and add to the emulsion; lastly add the cinnamon oil in the alcohol and shake the whole for several hours.

Cod-Liver Oil with Iron Iodide. (*Pharm. Zeit.*, 1909, **54,** 958.) Iodine, 1 Gm., is dissolved in ether, 20 Gm., and the solution is mixed with cod-liver oil, 100 Gm. The mixture is warmed to drive off the ether. Iron benzoate, 20 Gm., is dissolved on the water-bath in cod-liver oil, 980 Gm. When cold the two solutions are mixed and flavoured with peppermint oil, 20 drops; essential oil of bitter almonds, 10 drops; vanillin, 0·10 Gm. After standing for forty-eight hours it is filtered. The following is a Saxon formula: In the first place, *concentrated oil of ferrous iodide* is thus prepared: Iodine, 117 Gm., is rubbed down in a mortar with olive oil, 200 Gm., and transferred to a closed flask. Reduced iron, 10 Gm., is then added and the whole well shaken up at intervals until all the iodine has combined. It is then filtered and made up to 250 Gm. by washing the filter with olive oil. Of this concentrated oil of ferrous iodide, 25 Gm. is made up to 1,000 Gm. with cod-liver oil.

Collodion, and Flexile Collodion. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 944.) Collodion made as follows is more contractile than that of the official U.S.P. formula. Pyroxylin, 2 Gm.; ether, 75 c.c.; alcohol, 25 c.c. Flexile

collodion is best made without Canada balsam, thus:—Pyroxylin, 5 Gm.; ether, 72 c.c.; alcohol, 23 c.c.; castor oil, 5 c.c.

Colours, Odours, and Flavours in Pharmacy. W. Gartside. (*Pharm. J.*, 1909, **29**, 757.) *Red Colours.*—(1) Carmine, 3; glycerin, 25; solution of ammonia B.P., 25; water, sufficient to produce 100. Mix the water and the AmOH, triturate with the carmine and heat gently on a water-bath until the liquid has only a faint smell of AmOH. Cool, filter, add glycerin, and sufficient water to make 100. With this solution one can obtain anything from a most delicate coral-pink to a deep blood-red, and the quantity required is surprisingly small. A trace of acid, however, completely ruins this colour.

For acid preparations tincture of cudbear, prepared as follows, is recommended: (2) Powdered cudbear, 10; pine sawdust, 5; alcohol 45 per cent., sufficient to produce 100 by percolation. This gives an excellent colour, which will stand acid, but not alkali.

Brown is generally best obtained by a solution of ordinary caramel. Spirituous preparations, such as bay rum, precipitate a portion of the caramel, but sufficient is dissolved to produce a fine colour.

Yellow.—Perhaps the finest colour is given by tincture of saffron: Saffron, 1; alcohol 45 per cent., 25. Macerate seven days. But an efficient and cheaper preparation is made of: Annatto, 8 oz.; water, 16 oz.; alcohol, 8 oz.; tartaric acid, 150 grains.

Another good yellow is obtained from turmeric. If the preparation to be coloured is a fairly spirituous one, it will be sufficient to macerate a little powdered turmeric in it, but if it is an aqueous preparation, then it will be necessary to prepare a tincture of turmeric. Two ounces of good turmeric percolated to a pint with alcohol will be found to give a useful preparation.

Blue is a colour rarely required, but a solution of indigo-carmine is valuable.

By suitable admixture of these solutions almost any colour or shade of colour commonly required may be made. Thus by blending tincture of saffron or tincture of turmeric with solution of indigo-carmine in suitable proportions any desired shade of *green* can be obtained. *Purple* is obtained by combining solution of indigo-carmine with tincture of cudbear, whilst a suitable proportion of caramel with liquid annatto gives an excellent colour for syrup of raspberries.

Compound Almond Flavours for Cod-Liver Oil Emulsion.—(1) Essential oil of almonds s.a.p., 2½; oil of cinnamon, 7½; oil of lemon, 16.

Another flavour which has the merit of being distinct from the majority is: (2) Essential oil of almonds, 4; oil of wintergreen, 2½; oil of cinnamon, 6½; oil of nutmeg, 2½; chloroform, 5½.

Elixir saccharini of the B.P. Codex is, perhaps, the finest sweetening agent for this preparation.

Petroleum Emulsion, though not so popular as that of cod-liver oil, has now a very large sale. Inasmuch as there is no nauseous oil to be overpowered, this will take a more delicate flavour than the preceding emulsion, and there is nothing better than vanilla, slightly fortified with almond and a trace of cassia. (3) Essence of vanilla, 1 oz.; essential oil of almonds, 15 minims; oil of cassia, 5 minims.

Extract of Malt and Cod-Liver Oil.—The flavours given for cod-liver oil emulsion answer equally well for this preparation.

Stock Corrigent Syrup for Bitter Drugs.—Cinnamon, 20; ginger, 12; cloves, 8; nutmeg, 8; extract of licorice, 50; sugar, 750; alcohol, water, of each a sufficient quantity.

Reduce the spices to No. 40 powder, moisten with alcohol; allow to stand twenty-four hours, then pack in percolator and percolate with alcohol until 100 of percolate have been obtained. Mix this percolate with the sugar, and drive off the alcohol, using as little heat as possible. Continue the percolation of the spices, using water instead of alcohol, until 500 of percolate are obtained. Dissolve the extract of licorice in this percolate, add the aromatized sugar, let the whole just come to a boil, strain, and add enough water through the strainer to make 1,000.

Syrup of Chocolate.—Gelatin, 60 grains; chocolate, 1 oz.; glycerin, 1 oz. Soak the gelatin in cold water until it ceases to swell, add the chocolate and glycerin, melt on steam-bath, and add, with constant stirring, sufficient hot simple syrup to make one pint. When cold add 4 fl. drachms of vanilla essence. This is a useful flavour for quinine.

Orange and Lemon Tinctures and *Syrups* are recommended to be prepared as directed by Boa (*Y.B.*, **1909, 162.**) *Aromatic Syrup.*—Fresh bitter orange peel, cut small, 12½ oz.; alcohol 90 per cent., 52 fl. oz.; cinnamon water, 48 fl. oz. Prepare a tincture by the maceration process, filter clear, and add an equal volume of syrup. *Essence of Peppermint.*—Oil of

peppermint, 1 oz.; peppermint herb, ½ oz.; alcohol, 15 fl. oz. Macerate. The presence of the herb in this essence imparts a fullness and roundness of flavour which is quite absent from the B.P. preparation.

FRUIT SYRUPS.—*Black Currant Syrup* is a very widely used preparation, and it is easily made. Pick and clean the fruit, place in pan, and add sufficient water to just cover the fruit. Bring slowly to the boil, crushing the fruit with a wooden spoon. When thoroughly crushed, strain through fine cheese-cloth. Add 1½ lb. of sugar to each pint of juice. If the finished syrup is raised to boiling point, immediately run into suitable-sized bottles, and sealed up whilst hot, it will keep almost indefinitely without any risk of fermentation or mould. *Red Currant, Strawberry, Blackberry, Raspberry, and Mulberry Syrups* may be prepared in precisely the same manner. Another method of making excellent fruit syrups for use in cough mixtures, etc., is with acetic acid. Place the desired amount of fruit in a stone crock, stir well with a wooden spoon until the fruit is thoroughly crushed, not merely bruised. Then cover the fruit completely with a mixture of glacial acetic acid, 1 part; water, 15 parts. Let them stand about twelve hours, then strain but do not press. Finally add 1½ lb. of sugar to each pint of liquor, and dissolve by a very gentle heat, not exceeding 125°F.

Compound Syrup of Blackberries is an excellent foundation syrup for a children's cough mixture. It is made thus: Fresh blackberry juice, 3 pints; powdered cinnamon, 2 oz.; powdered cloves, 1½ oz.; powdered nutmeg, 1½ oz.; alcohol 20 per cent., 2 pints; simple syrup, 3 pints. Macerate the spices in the alcohol for seven days, add the other ingredients, shake occasionally during 24 hours, and filter.

Syrup of Horehound is not a fruit syrup, but as it is much used a formula is given: Horehound herb, well broken, 45; sugar, 85; water, a sufficient quantity. Digest the herb with sufficient boiling water to cover it for one hour on a water-bath. Strain, press, and evaporate to 45, cool and filter. This liquid must be filtered cold. Dissolve the sugar with gentle heat and adjust to 100 with water.

Colour Standards for Pharmaceutical Liquids. H. Roberts. (*Amer. J. Pharm.*, 1910, **82**, 166.) It is suggested that definite colour standards should be set for certain slightly coloured liquids, using dilute solutions of easily obtained substances for

the purpose of these standards, the tints to be compared by Nesslerizing. The word colourless should be deleted. Liquids should be required to be not more highly coloured than a certain amount of the specified colour standard, after dilution to a definite volume.

Cremor Bismuthi et Zinci, B.P.C. (Crême Imperatrice). (*Pharm. J.*, 1909, **29**, 37.) Bismuth oxychloride, 30 ; zinc oxide, in very fine powder, 30 ; wool fat, 5 ; oil of rose, 0·10 ; lard to 100. Mix the bismuth oxychloride and zinc oxide, and sift the mixture through fine muslin ; then melt the wool fat on a water-bath with six times its weight of lard, add the powder gradually, mix intimately by trituration in a mortar, add the oil of rose, and make up to the required weight with lard. This preparation is used for toilet purposes.

Cremor Hydrargyri Ammoniati Compositus, B.P.C. (Lowndes Cream). (*Pharm. J.*, 1909, **29**, 37.) Ammoniated mercury ointment, 1 oz. ; zinc ointment, 3 oz. ; glycerin, 2 fl. oz. Mix the ammoniated mercury and zinc ointments ; then gradually incorporate the glycerin so as to form a cream.

Cremor Mercurialis, B.P.C., Improved Formula for. R. R. Bennett. (*Pharm. J.*, 1910, **30**, 171.) Mercuric chloride, 13·6 ; hypophosphorous acid, 100 ; distilled water, alcohol 90 per cent., absolute alcohol, of each a quantity sufficient ; Japan wax, 7·5 ; camphor, 10 ; creosote, 10 ; almond oil, sterilized, sufficient to produce 100. Dissolve the $HgCl_2$ in 300 of boiling distilled water in a lipped beaker, filter if necessary, and cool the solution to 40°C. Add the hypophosphorous acid, stir very cautiously, and keep the mixture at about 40°C. for an hour, by which time the gelatinous white precipitate of HgCl which is first formed should be completely reduced to a heavy greyish-black precipitate of finely divided metallic mercury. Pour off the supernatant liquid, and wash the mercury by decantation with successive quantities of cold distilled water until the washings are no longer acid and contain no trace of chloride. The precipitated mercury is then transferred to a porcelain basin and washed first with EtOH, 90 per cent., and finally with a little absolute EtOH ; the latter should be poured off as completely as possible, and the basin then kept in a warm place until the last of the EtOH has evaporated. The camphor dissolved in 60 of the previously steri-

lized almond oil, cooled to about 40°C., is next added to the mercury, and the mixture is rubbed to a smooth cream with a sterile pestle; next the melted Japan wax is added, then the creosote, and finally enough sterilized almond oil to make the mixture measure 100.

Effervescent Salts. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 945, 955.) The following formulae give better granules, and better keeping products, than the official U.S.P. methods. The mixed powders should be gently heated to acquire a soft doughy consistence without any manipulation, and then be rubbed through a sieve and dried. The following quantities will produce about 1,000 parts of granules.

Effervescent Citrated Caffeine.—Citrated caffeine, 40; powdered tartaric acid, 150; acid citric, No. 24 powder, 335; sodium bicarbonate, 510; sodium carbonate crystals, No. 24 powder, 100.

Effervescent Magnesium Sulphate.—Magnesium sulphate, No. 24 granule, 500; dry to weight of 419, at moderate heat; then add freshly powdered citric acid, from uneffloresced crystals, 365; sodium bicarbonate, 428.

Effervescent Lithium Citrate.—Lithium citrate, No. 24 powder, 50; sodium bicarbonate, 575; sodium carbonate crystals, No. 24 powder, 50; powdered tartaric acid, 175; citric acid, uneffloresced crystals, No. 24 powder, 341.

Effervescent Potassium Citrate.—Potassium citrate, No. 24 granules, 200; sodium bicarbonate, 560; sugar, 75; citric acid uneffloresced crystals, No. 24 powder, 500.

Effervescent Sodium Phosphate.—Sodium phosphate, No. 24 granule, 100; dried sodium phosphate, 160; sodium bicarbonate, 480; powdered tartaric acid, 255; citric acid, uneffloresced crystals, No. 24 powder, 180.

Granular Effervescent Artificial Carlsbad Salt.—Artificial Carlsbad salt, powdered, N.F., 180; sodium bicarbonate, 500; sugar, powdered, 50; citric acid, uneffloresced crystals, 416. Powder the citric acid, and pass through a No. 24 sieve. Mix the other ingredients, then mix with them the citric acid. Heat the powders in a plate, on glass, or in a suitable dish to between 93 and 104°C. until it becomes moist; then rub through a No. 6 tinned iron sieve and dry the granules at not exceeding 54°C. Keep in well stoppered bottles.

Granular Effervescent Artificial Kissingen Salt.—Artificial Kissingen salt, powdered N.F., 280; sodium bicarbonate, 476;

citric acid, 400 ; sugar, powdered, 25. Proceed as in Carlsbad salts.

Granular Effervescent Potassium Bromide.—Potassium bromide, No. 24 powder, 110 ; sodium bicarbonate, 575 ; citric acid, 475 ; sugar, powdered, 50. Proceed as in Carlsbad salts.

Granular Effervescent Potassium Bromide with Caffeine.—As above, with the addition of caffeine, 11 ; and sugar, 5 more.

Granular Effervescent Artificial Vichy Salt.—Artificial Vichy salt, powdered, N.F., 240 ; sodium bicarbonate, 500 ; sugar, powdered, 50 ; citric acid, 416.

Granular Effervescent Vichy Salt with Lithium.—As above, but using artificial Vichy salt, powdered, 156 ; lithium citrate, No. 24 powder, 56.

Eggs for Pharmaceutical Use. C. Richet. (*J. Pharm. Chim.*, 1910, **1**, 614.) The importance of using only absolutely new laid eggs for pharmaceutical preparations is emphasized by the author's observation that the toxicity of the ovular liquid increases with the lapse of time. It is to this change, rather than to bacterial infection, that the cases on record of acute or sub-acute poisoning following the use of more or less stale eggs is to be attributed.

Elixir of Glycerophosphates. W. L. Cliffe. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 960.) Sodium glycerophosphate, 25 Gm. ; calcium glycerophosphate, 8·75 Gm. ; phosphoric acid, 10 Gm. ; glycerin, 240 c.c. ; angelica wine, 300 c.c. ; alcohol 94 per cent., 30 c.c. ; tincture of sweet orange peel, 10 c.c. ; distilled water, sufficient to make 1,000 c.c. The addition of H_3PO_4 is required by the glycerophosphates now on the market.

Elixir of Terpin Hydrate. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 954.) The terpin hydrate does not crystallize out when the following formula is employed. With the formula of the U.S.P., **1900,** it does so. Terpin hydrate, 17·5 Gm. ; tincture of sweet orange peel, 10 c.c. ; solution of saccharin, 1 c.c. ; alcohol, 94 per cent., 436 c.c. ; glycerin to make 1,000 c.c.

Emplastrum Salicylicum, B.P.C. (Corn Plaster). (*Pharm. J.*, 1909, **29**, 37.) Salicylic acid, in fine powder, 40 ; extract of Indian hemp, 5 ; rubber adhesive plaster, to 100. Dry the extract of Indian hemp on a water-bath, mix it intimately with 55 of

rubber adhesive plaster, previously melted on a water-bath, then add the salicylic acid, and mix thoroughly.

Enema Peptonum, B.P.C. (*Pharm. J.*, 1909, **29**, 37.) Beef peptone, 2½ oz.; water, to 20 fl. oz. Mix the beef peptone with the water. Dose, 2 to 4 fl. oz.

Enema Peptonum Composita, B.P.C. (*Pharm. J.*, 1909, **29**, 37.) Beef peptone, 2½ oz.; extract of malt, by weight, 2½ oz.; brandy, 5 fl. oz.; beef tea, to 20 fl. oz. Mix the beef peptone and extract of malt with 5 fl. oz. of beef tea; then add the brandy, mix, and make up to the required volume with beef tea. This preparation is used for rectal feeding. Dose: 60 to 120 c.c. (or 2 to 4 fl. oz.).

Ergot, Improved Extract of. F. Schaefer. (*Pharm. Zeit.*, 1909, **54**, 850.) Fat free ergot, 3,000 Gm., is intimately incorporated with a solution of $NaHCO_3$, 200 Gm., in water 7 litres; after standing for twenty-four hours, sufficient alcohol is added to the mass to bring the total alcoholic strength up to 40 per cent. by weight. Then sufficient spirit of the same strength is added to thoroughly submerse the powder and leave a supernatant liquid layer. The whole is then frequently stirred, finally allowed to subside, and the liquid decanted. The residual ergot is again extracted with more alcohol of the same strength until the total weight of alcoholic liquid is 40 kilos. The whole is then evaporated to 2 kilos, diluted with 1 litre of water, and shaken out in a separator for one hour with acetic ether. After standing for six hours, the acetic ether layer is separated and rejected. The aqueous portion is then shaken out with successive portions of acetic ether, until these are no longer coloured. It is then again shaken out once with Et_2O, the Et_2O layer separated and rejected, and then heated on the water-bath for a few minutes. To the cold liquid sufficient glycerin is added to make the final weigh 5 kilos. It is then filtered. This preparation keeps well, especially if 1 c.c. of Et_2O be added to each kilo of final product.

Ether, Efficacy of Various Drying Materials for. E. von Siebenrock. (*Monatshefte Chem.*, **30**, 759; *Chem. Zentralblatt*, 1910, **1**, 1228.) Comparative experiments have been made with the following drying agents, all of which were carefully dehydrated: $CaCl_2$; K_2CO_3; Na_2SO_4; $MgSO_4$; sylvin; KCl; $CaSO_4$; carnallite. Of these $CaCl_2$ and K_2CO_3 were by far the

most effective. Na_2SO_4 was the least efficient. For a mixture of alcohol and ether, carnallite was very active when used in large quantity.

Ethylene Dichloride as Solvent for Iodine for Skin Sterilization. A. J. Wallace. (*B.M.J.*, 1910, **1**, 1288.) Ethylene dichloride is an excellent solvent for iodine for skin disinfection ; it is preferable to acetone for the purpose, since it does not give off the acrid irritating vapour which causes great inconvenience with the latter ; it is also non-explosive. The iodine solution has only a slightly aromatic odour. The stain produced on the skin is not so intense, and there is no irritation or dermatitis. A few minutes to an hour before an operation the parts of the skin are first swabbed with a solution of ethylene dichloride and methylated spirit in equal parts ; then with pure dichloride ; the iodine solution is then painted on and the surface is protected with a sterile lint covering. The solution known as I.D.E., which is a saturated one, contains 2·48 per cent. of I.

Extract, Yield of ; and Amount of Extractive in Fluid Extracts and Wines of Certain Drugs. — Kunze. (*Pharm. Zeit.*, **55**, 157.)

Solid Extracts.—The percentage yield of extract obtained from the following material during the year 1909 is calculated on the "air dried" drug. Cascara bark, 25·8 to 28·5 ; cinchona bark, *Ph.G. IV.*, 30, with 7·95 per cent. moisture ; condurango, 17·5 to 18·3 ; *Viburnum prunifolium*, 22 88 ; thyme herb, 14·2, inferior, to 16·8 ; valerian root, 10·3 ; hydrastis, 19·5, inferior to 22·3 (moisture, 9·45 ; hydrastine, 3·1) ; ergot, 15·7 to 18·6. An extract yield below 15 per cent. for thyme, and 20 per cent. for hydrastis, is too low. An extract of ergot with a reputed cornutine content of 0·36 per cent. contained but 0·122.

Fluid extracts prepared by the author gave the following sp. gr. and percentage of dry extract : Orange peel, sp. gr. 1·043 ; extractive, 34·41. Cascara sagrada, sp. gr. 1·060 to 1·079 ; extractive, 18·79 to 27·5. Cinchona, *Ph.G. IV*, sp. gr. 1·145 ; total alkaloids, 8 per cent. Condurango, *Ph.G. IV*, sp. gr. 1·063 to 1·067 ; extractive, 25·08. Buckthorn, *Ph.G. IV*, sp. gr. 1·038 to 1·054 ; extractive, 17 to 20. Hamamelis, sp. gr. 1·052 ; extractive, 23. *Hydrastis canadensis*, *Ph.G. IV* ; sp. gr. 0·979 to 0·993 ; extractive, 20·83 to 21·63. *Piscidiae erythrinae*, sp. gr. 0·981. Ergot, *Ph.G. IV*, sp. gr. 1·055 to 1·060 ; extractive

15·7 to 16·85. Jambul fruit, sp. gr. 0·983 to 0·990; extractive, 7·37 (!) to 16·16. Thyme, sp. gr. 1·053 to 1·074. Valerian, sp. gr. 0·950. *Viburni prunifolii*, sp. gr. 0·969; extractive, 19·85.

Wines.—Cinchona, *Ph.G. IV*, sp. gr. 1·033; extractive, 13·44. Condurango, sp. gr. 1·001; extractive, 5·5. Diuretic wine, 1·011; extractive, 7·43. Ipecacuanha, sp. gr. 1·001; extractive, 5·42.

Extracts of Plants, Active, Unaltered. A. Goris and — Perrot. (*J. Pharm. Chim.*, 1909, **30,** 186.) The authors have devised a method for destroying the natural ferments of plants and extracting their active principles in their original state of combination. Alkaloids and glucosides are often found in fresh plants in complex combinations with tannins or other bodies, in a condition which renders them soluble in water and in alcohol, but insoluble in ether and in petroleum ether. The authors subject the fresh plants to the action of the vapours of neutral liquids boiling below 100°C. This treatment kills the natural ferments, without the material coming into contact with the liquid. The plants are then dried, powdered, extracted with alcohol 80 per cent., and the alcoholic extract is evaporated, *in vacuo*, without heat. The semi-solid extract is then kneaded under anhydrous ether, which removes chlorophyll and fat. The residual extracts are of different colours, according to their source. They are soluble in water, and are stated to contain all the active principles of the fresh plant in an unaltered condition.

Ferrous Sodio-Citrate, Ferrous Potassio-Citrate, and Ferrous Ammonio-Citrate Solutions. P. A. Lamanna. (*Chim. farmacist*, **4,** 33; *Nouveaux Remèdes*, 1910, **27,** 82.) *Ferrous ammonio-citrate solution*: The formula, $C_6H_5AmFeO_7$, is attributed to this compound. A 1 : 4 solution may be prepared thus. Citric acid, 39·88 Gm.; glycerin, 30 c.c.; and water, 30 c.c., are heated together in a 200 c.c. flask; then clean iron filings, 11·2 Gm., is added to the solution, which is heated at first to 80–90°C., and afterwards higher. The liquid is agitated well until a greyish precipitate of ferrous citrate forms, which arrests the action of the acid on the metal. Continuing the heat, 10 c.c. of AmOH are added, which dissolves the precipitate, and allows the reaction to proceed. As the precipitate again forms, it must be redissolved by the addition of more ammonia added gradually, until finally action ceases, and the liquid boils. When

completed, the liquid will have a slight odour of AmOH. It is then filtered hot, exactly neutralized with citric acid or ammonia, and made up or evaporated to 100 c.c. If the liquid shows a greenish tint, a little more AmOH should be added. Its final colour should be brown.

Ferrous sodio-citrate solution: Citric acid, 19·97 Gm.; glycerin, 30 c.c. Clean iron filings, 5·225 Gm.; pure NaOH, 4·675 Gm.; distilled water, q.s. to make 100 c.c. The method is similar to the preceding.

Ferrous potassio-citrate solution.—Like the above, the relative proportions of ingredients being acid citric, 0·8064 Gm.; iron, 0·1970 Gm.; KOH, 0·2441.

All these preparations contain approximately 20 per cent. of Fe. To dilute them, a mixture of glycerin in water 1 : 10 should be used. The ferrous sodio-citrate solution is best adapted for therapeutic use.

Fluid Extracts, Certain, of the U.S.P., 1900. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, **1909,** 57, 947.) *Aconite root*: The alcohol employed, 70 per cent., is needlessly strong. A strength of 41 per cent. exhausts the drug thoroughly, and the resulting fluid extract is more miscible with water. *Cimicifuga*: Alcohol, 60 per cent. exhausts the drug perfectly when repercolation is employed. The 92·3 per cent. alcohol is needlessly strong. *Taraxacum*: The preparation of the *U.S.P.*, **1890,** is preferable, using cold repercolation. *Licorice*: The **1890** process is satisfactory. and more convenient than that of the *U.S.P.*, **1900.**

Fluid Glycerates. G. M. Beringer. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 1009.) In continuation of previous work (*Y.B.*, **1909,** 146), the author reports on some fluid glycerates, the formulae of which have been improved. *Fluid glycerate of nux vomica*: Nux vomica in No. 20 powder, 100 Gm.; hydrochloric acid, 5 c.c. (or sulphuric acid, 4 c.c.); glycerin, 50 c.c.; water, 145 c.c.; chloroform water, q.s. Mix the acid with the water and glycerin; moisten the drug with 85 c.c. of the mixture and pack lightly in a percolator. Pour on sufficient of the menstruum to saturate the drug, and macerate for 48 hours. Then percolate slowly, using first the menstruum, then $CHCl_3$ water, until the drug is exhausted, reserving the first 50 c.c.; concentrate the remainder to 60 c.c.; add the reserve and

evaporate to 100 c.c. *Fluid glycerate of red rose* : Red rose in No. 60 powder, 100 Gm.; dilute sulphuric acid, 10 c.c.; glycerin, 50 c.c.; distilled water, 140 c.c.; chloroform water, q.s. Mix the glycerin acid and water, and having thoroughly mixed the rose with 300 Gm., of pure, iron-free, white sand, moisten with 80 c.c. of the menstruum. Then proceed as above. *Fluid glycerate of sanguinaria* : Sanguinaria in No. 20 powder, 100 Gm.; hydrochloric acid, 10 c.c.; glycerin, 50 c.c.; water, 140 c.c.; chloroform water, q.s. Mix the acid, glycerin and water and moisten the drug with 50 c.c. of the mixture. Place in percolator without packing, then proceed as above. New formulae for alkaline fluid glycerates are: *Fluid glycerate of buchu* : Buchu in No. 20 powder, 100 Gm.; solution of KOH (sp. gr. 1·036), 50 c.c.; glycerin, 50 c.c.; water, 100 c.c.; chloroform water, q.s. Mix the KOH solution, glycerin and water; moisten the drug with 100 c.c. of the mixture. Shake down evenly in a percolator, saturate and macerate for 24 hours. Then proceed as above. *Fluid glycerate of eriodictyon* : Eriodictyon, 100; solution of NaOH (sp. gr. 1·059), 50 c.c.; glycerin, 50 c.c.; water, 100 c.c.; $CHCl_3$ water q.s. Proceed as in the case of buchu. Fluid glycerate of grindelia is similarly prepared, using KOH solution, 50 c.c., instead of NaOH.

Formaldehyde, Alleged Production of, by Boiling Solutions of Cane Sugar. C. H. La Wall. (*Amer. J. Pharm.*, 1909, **81**, 394.) A. A. Ramsay (*Proc. Roy. Soc.*, New South Wales, **41**, 172) has stated that when sugar is boiled with water, formaldehyde is formed. This statement was founded on the fact that distillates from boiling sugar and water give a positive reaction with Hehner's milk H_2SO_4 test. The author points out that this test is not distinctive of formaldehyde, but is a general test for all aldehydes. He finds that formaldehyde is not formed under these conditions. The reactions obtained with Hehner's reaction are due to a trace of furfural formed. Rimini's test, with phenyhydrazine hydrochloride and sodium nitroprusside is more satisfactory, since although it shows the presence of 1 of formaldehyde in 500,000, it does not react with furfural. The author confirms Ramsay's results that a reaction is obtained, but interprets them to indicate the presence of furfural and not of formaldehyde, as the following experiments show:—

	Hehner's Test for Formaldehyde.	Rimini's Test for Formaldehyde.	Aniline Acetate for Furfuraldehyde.
Cane sugar distillate No. 1 . . .	Positive	Negative	Positive
Cane sugar distillate No. 2 . . .	Positive	Negative	Positive
Formaldehyde 1/50,000	Positive	Positive	Negative
Formaldehyde 1/1,000,000 . . .	Positive	Positive	Negative
Levulose distillate	Positive	Negative	Positive
Cane sugar distillate (with citric acid)	Positive	Negative	Positive
Cane sugar distillate (with tartaric acid)	Positive	Negative	Positive
Commercial furfuraldehyde . . .	Positive	Negative	Positive
Freshly made furfuraldehyde . . .	Positive	Negative	Positive

Formulae from Hungarian Pharm., Ed. III. (*Amer. Drugg.*, 55, 370.) *Fluid Extract of Cascara Sagrada.*—Cascara sagrada, 500 Gm.; licorice root, 50 Gm.; magnesium oxide, 25 Gm. Percolate with a mixture of alcohol 90 per cent., and water, equal parts. Collect the first 425 Gm., evaporate the second portion to 50 Gm,. and dissolve in 25 Gm. of tincture of bitter orange peel; add this solution to the first portion.

Chloral-Bromide Mixture.—Extract of hyoscyamus, mixed with equal part of dextrin, 5 Gm.; dissolve in peppermint water, 150 Gm.; add potassium bromide. Chlorate hydrate, of each 50 Gm.; extract of licorice, 10 Gm.; syrup of orange peel, 234 Gm.; aromatic tincture, 1 Gm.; chloroform, gtt. x.

Camphorated Oil.—Camphor, 25 Gm. Reduce to powder with the aid of a few drops of ether and dissolve by slightly warming in sesame oil, 75 Gm.; add dried sodium sulphate, 8 Gm.; filter.

Syrup of Orange.—Tincture of orange for syrup, 50 Gm.; magnesium carbonate, 5 Gm.; distilled water, 325 Gm.; filter and add distilled water, q.s., 375 Gm.; in which dissolve sugar, 625 Gm.

Syrup of Potassium Guaiacolsulphate.—Potassium guaiacolsulphate, 35 Gm.; dissolve in water-bath in distilled water, 115 Gm.; syrup of orange, 325 Gm.; alcohol 70 per cent., 25 Gm.

Tincture of Orange for Syrup.—Orange peel, 500 Gm.; macerate with alcohol 70 per cent., 300 Gm.; and then percolate to obtain 1,000 Gm.

Boric Acid Ointment.—Hard paraffin, 50 Gm.; white wax,

50 Gm.; liquefy on water bath, adding sesame oil, 300 Gm.; then a solution of boric acid, 25 Gm.; glycerin, 75 Gm.

Formulae from the New French Codex. (*Chem. and Drugg.*, 1910, 165.) *Pilules de Creosote.*—Creosote, 10 Gm.; dried and powdered medicinal soap q.s. for 100 pills. *Pilules de Cynoglosse Opiacées.*—Extract of opium, powdered henbane-seeds, and powdered root-bark of hounds-tongue, of each 10 Gm.; powdered myrrh, 15 Gm.; powdered olibanum, 12 Gm.; powdered saffron and castorum, of each 4 Gm.; syrup of honey, 35 Gm. Dissolve the extract in the syrup on a water-bath, place in a mortar, and mass the other ingredients with it. Divide into 20-centigramme pills. *Pilules d'Iodure Ferreux.*—Iodine, 4·1 Gm.; iron filings, 2 Gm.; distilled water, 6 Gm.; honey, 5 Gm.; powdered licorice and marshmallow, equal parts q.s. Put the iron and the water into a glass flask, and add the iodine gradually, shaking after each addition. When the liquid becomes greenish, filter into a tared capsule containing the honey; wash the flask with several grams of water, which pour on to the filter, and evaporate the solution to 10 grams, and when cool form a mass with the mixed powders. Divide into 100 pills. *Pilules d'Iodure Mercureux Opiacées* (Pilules de Ricord).—Red iodide of mercury, recently prepared, 50 Cgm.; powdered opium, 20 Cgm.; powdered licorice, 30 Cgm.; honey, a sufficiency. Mix the powders, add the iodide, mass, and divide into ten pills. *Pilules de Jusquiame et de Valériane Composées* (Pilules de Méglin).—Extracts of henbane and valerian, and oxide of zinc, of each 50 Cgm.; for ten pills. *Pilules Mercurielles Savonneuses* (Pilules de Sédillot).—Mercurial ointment (fresh), 6 Gm.; powdered medicinal soap, 4 Gm.; powdered licorice, 2 Gm.; for sixty pills. *Pilules Mercurielles Simples* (Pilules Bleues).—Mercury, 5 Gm.; honey, 4 Gm.; powdered white sugar, 2 Gm.; powdered red roses, 4 Gm. Triturate the first three together, and mass with the roses. To make 100 pills. *Pilules de Podophylline Belladonées.*—Powdered podophyllin, 30 Cgm.; belladonna extract, 10 Cgm.; medicinal soap, 30 Cgm.; for ten pills. *Pilules de Térébenthine.*—Purified Bordeaux turpentine and powdered light magnesium carbonate, of each 2 Gm. For ten pills. *Pommade d'Acide Boriqué* (Pommade boriqué; vaseline boriqué).—Boric acid, very finely powdered, 10 Gm.; vaseline, 90 Gm.; mix. *Pommade Belladonnée.*—Extract of belladonna, 3 Gm.; glycerin, 2 Gm.; benzoated lard, 25 Gm.

Soften the extract with the glycerin and mix with the lard. *Pommade de Bourgeons de Peuplier* (Onguent Populeum).—Dried poplar buds, 8 Gm.; dried leaves of belladonna, henbane, black nightshade, and poppy, of each 1 Gm.; lard, 40 Gm.; alcohol 95 per cent., 4 Gm. Macerate the leaves in the alcohol for twenty-four hours; add the lard and heat the whole on a water-bath for three hours, stirring frequently, then add the bruised poplar buds and digest for 6 hours on a water-bath. Strain with strong expression, allow to cool slowly. *Pommade de Calomel.*—Calomel, 1; vaseline, 9; mix in a mortar. *Pommade Camphrée.*—Camphor, 2; benzoated lard, 7; white wax, 1. Liquefy the lard and wax at a gentle heat and add the camphor. *Pommade de Chloroforme.*—Rectified chloroform, 2; white wax, 1; lard, 17. Melt the lard and wax on a water-bath in a flask; allow to cool to a cream, add the chloroform, and shake briskly. *Pommade de Chlorure Mercurique* (Vaseline au sublimé corrosif).—Mercuric chloride, finely powdered, 1; vaseline, 1,000. Mix intimately. *Pommade Citrine* (Onguent Citrin).—Lard and olive oil, of each 10; mercury, 1; nitric acid, 2. Dissolve the mercury in the nitric acid in the cold; melt the lard in the oil at a gentle heat; when the fats are beginning to solidify add the mercurial solution; mix intimately and run into paper moulds. *Pommade Epispastique Jaune.*—Cantharides (in No. 15 powder), 60; lard, 870; yellow wax, 125; powdered curcuma and oil of lemon, of each 5. Digest the cantharides in the lard for 4 hours on a water-bath in a closed vessel; allow to settle; decant; add the powdered curcuma, digest for an hour; then filter through paper at the temperature of boiling water. Place on a water-bath, add the wax, and when melted set aside the mixture till nearly cold, then add the oil of lemon. *Pommade Epispastique Verte.*—Cantharides (in No. 37 powder), 3; pommade of poplar buds, 85; white wax, 12. Melt the wax at a gentle heat with the pommade, add the powdered cantharides little by little, and set aside until the pommade is cold. *Pommade de Goudron.*—Purified vegetable tar, 1; lard, 9. *Pommade d'Iodoforme* (Vaseline Iodoformée).—Iodoform in powder, 1; vaseline, 9. *Pommade d'Iodure de Plomb.*—Iodide of lead, 1; benzoated lard, 9. *Pommade Mercurielle à Parties Egales* (Onguent Napolitain).—Purified mercury and benzoated lard, of each equal parts; mix in the B.P. manner. *Pommade Mercurielle Faible* (Onguent Gris).—Strong mercurial pommade, 1; benzoated lard, 3. *Pommade d'Oxide de Mercure Jaune.*—

Yellow oxide of mercury, 1; vaseline, 19. *Pommade d'Oxide de Mercure Rouge.* (Pommade de Lyon).—Red oxide of mercury levigated, 1; vaseline, 19. *Pommade d'Oxide de Zinc.*—Oxide of zinc, 1; vaseline, 9. *Pommade de Phénol* (Vaseline Phéniquée; Vaseline Phénolée).—Phenol, 1; vaseline, 99. Melt the vaseline on a water-bath (50°C.) in a glass flask; add the phenol and beat with a glass rod till dissolved. *Pommade de Précipité Blanc.*—White precipitate, 1; vaseline, 9. *Pommade de Salicylate de Phényle* (Vaseline Salolée).—Salol, 1; vaseline, 9. Put into a flask and heat on a water-bath (50°C.), stir until dissolved. *Pommade Soufrée.*—Sublimed sulphur and almond oil, of each 1; benzoated lard, 8. *Pommade de Styrax* (Onguent Styrax).—Purified liquid storax, purified elemi and yellow wax, of each 16; resin, 29; olive oil, 25. Melt at a gentle heat the resin, wax, and elemi, remove from the fire, add the storax, then the oil, and strain through linen.

Formulae suggested for Inclusion in the New Ph.G., V. *Emplastrum saponatum salicylatum.* (*Apoth. Zeit.*, 1910, **25,** 156.) Soap plaster, 8; white wax, 1; salicylic acid, in fine powder, 1. Melt the plaster and wax, and mix the salicylic acid with the half-cold mass.

Emulsio olei jecoris aselli (*Apoth. Zeit.*, 1910, **25,** 156.) Cod-liver oil, 500 Gm.; powdered gum acacia, 5 Gm.; powdered tragacanth, 5 Gm.; white gelatin, 1 Gm.; calcium hypophosphite, 5 Gm.; cassia water, 100 Gm.; benzaldehyde, 3 drops; simple syrup, 84 Gm.; water, 300 Gm. The gums are suspended in a capacious bottle and well shaken for five minutes with a cold solution of the gelatin in the water. The emulsion in then mixed with the calcium hypophosphite previously dissolved in the cassia water, and the benzaldehyde and syrup are added. After a few hours the mixture is again well shaken.

Liquor aluminii acetico-tartarici (*Apoth. Zeit.*, 1910, **25,** 156). Solution of aluminium acetate, 500; tartaric acid, 15; acetic acid (30 per cent.), 6. The tartaric acid is dissolved in the solution of aluminium acetate, and the solution is evaporated to 114, in a porcelain dish on the water-bath. It is then set aside for several days in a closed vessel in a cool dark place and filtered. The acetic acid is then added, sp. gr. 1·260 to 1·263. If 6 c.c. be warmed with 3 c.c. of $KMNO_4$ solution, the mixture should be colourless and clear. When diluted with 4

parts of water it gives after adding AmOH a thick gelatinous precipitate readily soluble in NaOH. If 2 c.c. of the solution, diluted with 4 c.c. of water, is heated nearly to boiling on the water-bath, with 1 c.c. of alcoholic zinc acetate solution, a copious white precipitate is formed which nearly redissolves on cooling. When similarly diluted with water, the original solution should be unaffected by H_2S solution. Five Gm. of the solution should not give less than 2·24 Gm. of dry residue when evaporated to dryness on the water-bath.

Liquor ferri oxychlorati dialysati (*Apoth. Zeit.*, 1910, **25**, 126). Ferric chloride solution (sp. gr. 1·280 to 1·282), 50; solution of ammonia (sp. gr. 0·960), 33. The Fe_2Cl_6 solution is cooled with ice water, and the AmOH solution added thereto a little at a time with constant stirring, the precipitate formed each time being allowed to dissolve before adding more AmOH solution. This is then dialyzed until the water gives not more than a trace of reaction for Cl, when acidified with HNO_3 and treated with $AgNO_3$. The product is then adjusted to the sp. gr. 1·045 to 1·046 either by dilution with water, or by evaporation below 40°C. It should give no blue colour with K_4FeCy_6 reagent. Twenty c.c. heated to boiling with NaOH should give off no AmOH sufficient to give a blue colour to moist red litmus paper (absence of AmCl). Twenty c.c., treated with excess of AmOH and filtered, should give a colourless filtrate (absence of Cu salts). Five c.c. heated until clear with 15 c.c. of HNO_3, then treated with 4·5 c.c. of N/10 $AgNO_3$ solution, and filtered, should give no further precipitate when more of the reagent is added to the clear filtrate (absence of excess of Cl). To determine the strength, 10 c.c. of the solution is heated in a graduated 100 c.c. flask with 10 c.c. of HCl, so as to obtain a clear solution; 2 Gm. of KI is added to the cold solution, and the mixture allowed to stand for an hour, the flask being stoppered. The contents are then made up to 100 c.c. Twenty c.c. of the solution when titrated with N/10 thiosulphate solution should require not less than 12·5 to 13·5 c.c. to combine with the liberated I; equivalent to 3·3 or 3·6 per cent. of Fe.

Ointments, New, for Ph.G. V. (*Apoth. Zeit.*, 1910, **25**, 164.) *Soft ointment*: Yellow vaseline, 1; lanoline, 1; mix. *Hard ointment*: *Unguentum Paraffini* Ceresin, 4; liquid paraffin, 5; wool-fat, 1.

Collemplastrum adhaesivum (*Pharm. Zentralh.*, 1910, **51**, 191). Wool-fat, 67; copaiba balsam, 8; caoutchouc, 25; powdered

orris root, 25; petroleum spirit, q.s. The washed and rolled rubber is covered with petroleum spirit, 150; and allowed to macerate at normal temperatures, with frequent rotation but without shaking, until a uniform solution is obtained. The wool-fat and copaiba are melted together, then heated to 100°C. for ten minutes. The partly cold mixture is dissolved in petroleum spirit, 15, and when cold, added to the rubber solution. This is then mixed with the powdered orris root, previously dried at 100°C., and mixed to a uniform paste with a little petroleum spirit. The whole is then well mixed, and when no other medication is prescribed, spread on shirting so as to give a plaster, including the linen, 9 mm. thick. This is dried at the ordinary temperature.

Collemplastrum zinci (*Pharm. Zentralh.*, 1910, **51,** 191). Wool-fat, 260; copaiba balsam, 32; zinc oxide, 144; finely powdered orris root, 55; caoutchouc, 55; petroleum spirit, 720. The above process is followed; the zinc oxide and orris being incorporated with the fats, warmed and incorporated with the rubber solution.

Fumiform Inhalations for Pulmonary Tuberculosis and for Whooping Cough. H. Floer. (*Nouveaux Remèdes*, 1910, **27,** 218.) Fumiform is a mixture of asphalte, benzoin and myrrh, put up in the form of tablets weighing 2 Gm. One or two of these is vapourized over a spirit lamp, so as to saturate the atmosphere of a small room with the vapour. The patient is then kept in this atmosphere in a recumbent position for 1 or 2 hours, twice daily. The addition of the aromatic gum resins renders the odour of the vapours less unpleasant.

Fumigation for Pulmonary Affections. (*Med. Press.*, 1910, **89,** 118.) Creosote, 3 dr.; oil of eucalyptus, 1 dr.; benzoic acid, 1 dr.; proof spirit, 6 fl. ozs., vapourized in the sickroom at night, is of great benefit to the patient in cases of phthisis, chronic bronchitis, whooping cough, and other respiratory affections. The only apparatus required is an iron tablespoon. Every evening when the room is closed for the night, the spoon is filled with the mixture, which is ignited with a match, and allowed to burn itself out.

Gelanthum and Eucerin Ointments. K. Ebert. (*Pharm. Zentralh.*, 1910, **51,** 68.) *Gelanthum* is a 1 : 10 solution of gelatin, heated until it has lost its gelatinizing property. White gelatin

10 is dissolved in water 1,000, and the solution is boiled down, over a naked flame, to 100. When cold it is again diluted with water, and further boiled, until when evaporated to 100 it no longer sets to a jelly. The gelanthum is then prepared from this gelatin solution, 100 Gm.; tragacanth, 10 Gm.; glycerin, 20 Gm.; benzoic acid, 1·2 Gm.; otto of rose, 4 drops; distilled water, to 400 Gm. *Gelanthum cream*: Zinc oxide, 5; anhydrous eucerin, 10; add gradually with constant stirring to gelanthum, 85. Perfume with essence of jasmin, essence of lilac, of each 0·5. *Pasta lepismatica*: Unna's zinc paste, 40; resorcin, 40; ichthyol, 10; anhydrous eucerin, 10. *Zinc oxide paste*: Zinc oxide, 24; kieselguhr, 4; benzoated eucerin, 72. *Benzoated eucerin*: Benzoic acid, 1; dissolved on the water-bath in anhydrous eucerin, 99; when cold incorporate water, 50. *Soft zinc paste*: Precipitated chalk, 20, is rubbed down with anhydrous eucerin, 40; water, 20, is then added drop by drop. When thoroughly incorporated, zinc oxide 20 is mixed in. *Sulphur zinc paste*: Zinc oxide, 14; precipitated sulphur, 10; kieselguhr, 4; benzoated eucerin, 72. A little water separates from this when first mixed. After standing ten minutes, it should be again beaten up, when this will take up. By adding 1 c.c. of aluminium acetate solution before the kieselguhr, for each 100 Gm. of paste a much larger amount of water may be taken up. *Unguentum plumbi refrigerans*: Lead carbonate, 3; zinc oxide, 1; eucerin, 26; solution of lead subacetate, 20. *Unguentum pomadinum*: Anhydrous benzoated eucerin, 65 Gm.; distilled water, 35 Gm.; otto of rose, 2 drops; extract of violet; extract of reseda; extract of jasmin, of each 2 drops. *Eucerin zinc ointment*: Zinc oxide, 3; hydrated eucerin, 27. *Eucerin iodine ointment*: Iodine, 2·5; KI, 5; water, q.s.; eucerin, to make 50. (See also *Y.B.*, **1908**, 277; **1909**, 144.)

Gelatin for Pharmaceutical Use. J. A. Torret. (*Pharm. J.*, 1910, **30**, 292.) Sheet gelatin employed for making capsules and other preparations should always be washed in cold water before use. This removes a considerable amount of adhering foreign matter.

Gelonide as a Disintegrant for Tablets. —Dreuw. (*Apoth. Zeit.*, 1910, **25**, 80.) If a few drops of formaldehyde solution be added to a relatively large amount of gelatin, trioxymethylene-gelatin or gelonide is formed. This has a horny brittle consistence, and is easily powdered. If about 10 per cent. of this is

added to the drug to be compressed, the tablets produced will be easily disintegrated almost immediately on contact with water. The amount of formaldehyde present, about 0·0001 Gm. for every 1 Gm. tablet, is so minute that it may be disregarded.

Glass, Influence of the Quality of, on Pharmaceutical Preparations. — Lesuic. (*J. Pharm. Chim.*, 1910, **1**, 67, 119.) Given perfectly neutral glass, there are very few medicinal substances which may not be heated in an autoclave to 120°C. for twenty or thirty minutes, as in the process of sterilization, without undergoing any decomposition. Heat alone, at this temperature, does not generally affect them. But the presence of a minute trace of impurity, derived from the glass, may cause marked alteration. As the result of a long series of experiments, the author finds that for *hydrolizable substances,* such as *cocaine salts,* only neutral glass vessels can be used. Neutral glasses are those which give no indication of alkalinity when heated with water for twenty minutes at 120°C. in an autoclave, with Poulenc's sodium-alizarin sulphonate reagent as indicator. Such glasses are the best quality of Jena make, by Shott and Genossen ; Serax, by Appert ; and Cologne glass, by Ehrenfeld. For solutions of those salts which precipitate with calcium, such as *phosphates, arsenates* and others, only non-calcareous glasses, with a base of alumina zinc, or magnesia, are available. These include those enumerated above and that of Légras, with some others. For more stable salts, such as the cacodylates and methylarsinates, also salts of strychnine, sparteine, mercury, and other stroug bases, a minute trace of alkali may be tolerated in the glass. But this must not exceed the equivalent of 5 c.c. of N/100 NaOH for every 100 c.c. of capacity, after exposure to 120°C. in an autoclave for thirty minutes. For solutions of iodides, chlorides, bromides and such salts, all glasses containing Pb must be rigorously excluded. (See also *Y.B.*, **1905,** 253 ; **1908,** 262.)

Guaiacol, Some Preparations of. — Hecht. (*Therap. der Gegenwart.*) *Application for neuralgias*: Guaiacol, 10 ; menthol, 5 ; oleobalsamic mixture, to 100. *Ointment for tuberculous fever* : Guaiacol, 5 Gm. ; neroli oil, 3 drops ; lanoline, yellow vaseline, of each 47·5 Gm. *Ointment for rheumatism* : Guaiacol, 5 ; ichthyol ointment, 45.

Hydriodic Acid, Dilute. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.,* 1909, **57,** 943.) The following method gives a cleaner

preparation than the official U.S.P. process. Solution of ferrous iodide N.F., 150 c.c.; barium hydrate crystals, 125 Gm. Dilute sulphuric acid about 42·2 Gm., diluted with 100 c.c. of water; dilute hypophosphorous acid, 50 Gm.; distilled water, to make 1,000 Gm. Dissolve the Ba2(OH) in 500 c.c. of hot water, and add the solution to the FeI_2 solution. Keep the mixture hot for thirty minutes, drain on cloth, and wash the magma free from BaI_2. Concentrate to 400 c.c., add enough H_2S to remove all Fe; filter; add slowly with constant stirring the dilute H_2SO_4 until there is a slight excess present; allow to subside, decant the clear liquid; wash the precipitated $BaSO_4$ several times by decantation, with distilled water; bulk the clear liquid, add the hypophosphorous acid; assay, and adjust to 10 per cent. HI by addition of distilled water.

Hydrogen Peroxide, Preservation of. A. R. L. Dohme and H. Engelhardt. (*Amer. Journ. Pharm.*, 1910, 69.) The use of acetanilide as a preservative of H_2O_2 solutions should be prohibited. Several samples of the peroxide examined to which acetanilide had been added developed a strong smell of nitrobenzene, which showed that a decomposition had taken place. In place of acetanilide the use of an excess of either H_2SO_4 or H_3PO_4 is strongly recommended, inasmuch as these two acids are not liable to be acted upon by the peroxide, and they suggest that the official (U.S.P.) amount of acid allowed (0·036 per cent.) should be doubled. This would fully allow for neutralization by the alkali of the glass, and at the same time be too small to have any detrimental effect on surgical instruments or to affect the most sensitive mucous surfaces of the body.

Icthyol Deodorized. — Helmers. (*L'Union pharm.*, 1909, **50**, 198.) Icthyol may be completely deodorized by frequently shaking up 20 parts with 15 parts of water and 10 parts of H_2O_2, 10 vols., for forty-eight hours. The mixture is then evaporated on the water-bath, and the residue is made up to 20 parts by adding water and sufficient AmOH to give a neutral reaction.

Iodine Tincture, Nature of Changes in. C. Courtot. (*J. Pharm. Chim.*, 1910, **1**, 297, 354.) On keeping, hydriodic acid, aldehyde, and acetic ether are found in tincture of iodine. The iodine acts on the alcohol, forming hydriodic acid and aldehyde. The latter forms hydriodic acid with the iodine, and is

partly oxidized into acetic acid; this esterifies with a portion of the alcohol. The action proceeds rapidly during the first two months, then gradually slackens, and, in about eight months, becomes arrested. The amount of hydriodic acid formed is considerable. In the tincture of the new Codex, which contained 87·63 Gm. of free iodine per litre when first prepared, gave 15·36 Gm. of HI seven months afterwards, and only 72·32 Gm. of free iodine.

Iodobenzine, Heusner's. (*Pharm. Zentralh.*, 1910, **51**, 193.) Tincture of iodine, 10; benzine, 750; liquid paraffin, 250.

Iodoform Oil, Compound, for Treatment of Tuberculous Ulcers. A. Paris. (*L'Union pharm.*, 1910, **51**, 206.) Guaiacol, 2 Gm.; creosote, 2 Gm.; iodoform, 5 Gm.; anaesthetic ether, 20 Gm.; purified and sterilized olive oil, to make 100 c.c. Rub down the iodoform with the guaiacol in a mortar; add the creosote, then the ether, in portions to dissolve the iodoform. Transfer to a graduated flask, make up to 100 c.c. with the pure sterilized olive oil. Put up in small stoppered bottles, and store in the dark.

Iron Albuminate Solution. W. G. Nebig. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 961.) Dry egg albumin, 40 Gm.; solution of ferric chloride, 45·5 Gm.; solution of ammonia, 34·5 c.c.; sodium citrate, 25 Gm.; aromatic elixir, 400 c.c.; distilled water, to make 1,000 c.c. Dissolve the albumin in water 2,000, and digest at 40°C. until a portion of the solution gives no precipitate on boiling. Dilute the AmOH with an equal volume of water, and add it slowly to the Fe_2Cl_6 solution, allowing the precipitate to redissolve each time before adding more. When all has been added, dilute to 2,000 c.c., and add the albumin solution to the iron solution slowly with constant stirring. Precipitate this mixture with a dilute solution of NaOH until the mixture is neutral. Allow the precipitate to subside, wash it until the washings are practically free from Cl, collect and drain, transfer to a porcelain dish, add the sodium citrate, previously dissolved in 50 c.c. of water, and gently heat until the magma has dissolved. Cool, add the aromatic elixir, and make up the volume to 1,000 c.c. with distilled water.

Iron Caseinate Solution. Nils de Verdier. (*Farm. Revy.*, 1910 [11]; *Apoth. Zeit.*, 1910, **25**, 264.) Skim milk, 1,300 Gm., is sterilized at 85°C. for a few minutes, mixed with an equal

volume of water, and slowly poured with constant stirring into a mixture of solution of ferric chloride (sp. gr. 1·28), 270 Gm.; in water, 2 litres. The caseous precipitate is then quickly washed, at first by decantation, then on a strainer, until the washings give only a slight Cl reaction. The precipitate is then rubbed down with glycerin, 10 Gm., and treated with a mixture of NaOH solution (sp. gr. 1·168), 9 Gm.; and water, 200 Gm. When solution is complete, glycerin, 40 Gm.; simple syrup, 100 Gm.; alcohol 90 per cent., 50 Gm.; tincture of orange, 25 Gm.; bitter orange oil, 12 drops, are added, and the final weight made up to 1,000 Gm. with distilled water. It contains about 0·95 per cent. of Fe. *Iron caseinate tablets* may be prepared by mixing the alkaline solution of the caseinate with sugar, evaporating to dryness, powdering, mixing the powder with cacao, and compressing.

Iron Solutions, Ferric, Medicinal, of the U.S.P., Improved Formulae for. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 957.) *Solution of ferric oxychloride*: Ferric sulphate solution, 350; sodium hydroxide, 146; granulated sugar, 28; hydrochloride acid, 35; sodium citrate, 127; distilled water to make 1,000. Pour the $Fe_2 3SO_4$ solution, largely diluted, into the NaOH solution, also well diluted, containing half the sugar dissolved in it. Decant, and wash twice with water, each washing containing 7 Gm. of sugar dissolved in the water. Collect and drain, and slowly add the magma to the HCl diluted with water 50. Add the sodium citrate, and when all the precipitate is dissolved dilute with distilled water to 1,000. Keep in well stoppered bottles.

Solution of iron albuminate: Dried egg albumin, 8 Gm.; solution of iron oxychloride, as above, 130 c.c.; aromatic elixir, 400 c.c.; alcohol, 94 per cent., 120 c.c.; distilled water to make 1,000 c.c. Dissolve the albumin in water 180; add the oxychloride solution with constant stirring; when quite clear add the elixir and alcohol, previously mixed, and adjust to volume. Let stand overnight, then filter.

Solution of iron peptonate: As above, but using peptone 9.75 Gm. dissolved in cold water, 150 c.c. and 200 c.c. of the iron oxychloride solution.

Solution of iron peptonate with manganese: Dry peptone, 3·5 Gm.; solution of iron oxychloride, 71·5 c.c.; soluble manganese citrate, 8 Gm.; alcohol 94 per cent., 150 c.c.; aromatic

elixir, 50 c.c.; distilled water to make 1,000 c.c. Dissolve the peptone in 150 c.c. of cold water; add the iron oxychloride solution; when the mixture is clear, add the manganese dissolved in water 100; then add the aromatic elixir to alcohol, previously mixed. Finally adjust to volume with water, let stand for two days, and filter.

Iron Lactate Pills for Chlorosis. (*Formulary of Nouveaux Remèdes*, 1910, **27** [10].) Iron lactate, $1\frac{1}{2}$ grains; aloes, $\frac{1}{6}$ grain; extract of rhubarb, q.s. to mass. For one pill. From 2 to 4 pills to be taken daily.

Kola Extract of the French Codex, 1908. J. Warin. (*J. Pharm. Chim.*, 1910, **1**, 543.) Powdered kola is required to contain 1·25 per cent. of caffeine, and to yield, when extracted with alcohol 60 per cent., 12·5 per cent. of extract containing 10 per cent. of caffeine. Practically this amount of caffeine in the finished extract is not attainable by the official process. In this the powder is extracted with alcohol 60 per cent., the alcohol is distilled, the residue *is filtered*, and the filtrate is evaporated to a firm extract. In the first place, the act of filtration of the distillation residue removes a considerable portion of the caffeine, which is less soluble in the aqueous residue than in the original alcoholic liquid. Then the amount of extractive yielded by kola nut powder to alcohol 60 per cent. is very markedly higher than 12·5 per cent. It is impossible, therefore, to obtain an extract answering the official requirements even when employing kola nut considerably richer in caffeine than 1·25 per cent. Thus, a parcel of powdered kola assaying 1·83 per cent. of caffeine was extracted on the large scale with 60 per cent. alcohol, and the alcoholic extract was divided into two parts. One of this was distilled, the residue was *filtered* as officially directed, and the filtrate evaporated to an extract. This amounted to 14·7 per cent. of the original kola powder, and contained only 5·45 per cent. of caffeine. The other portion, treated similarly, but *without filtration*, gave 16·3 per cent. of extract, containing 7·75 per cent. of caffeine.

Lard and Ointments, Pimento Oil to Prevent Rancidity in. G. Welborn. (*Pharm. J.*, 1909, **29**, 390.) The addition of a minute quantity of essential oil of pimento to prepared lard or ointment bases is suggested as a preservative. Lard and ointments thus preserved are found to keep in good condition for two years.

Lard, Rapid Test to detect Paraffin in. H. S. Shrewsbury. (*Pharm. Zentralh.*, **50,** 1026.) A saponifying reagent is prepared by dissolving NaOH, 45·3 Gm., in water to make 100 c.c., and adding the solution to glycerin, 500 c.c. Five Gm. of the lard is melted in a 200 c.c. flask and saponified with 20 c.c. of the NaOH glycerin reagent. To the hot mass commercial methyl alcohol, 50 c.c., is added drop by drop from a pipette. On cooling if the lard be pure the solution will be clear. In the presence of paraffin a separation of opaque flocks will appear. After a time the solution gelatinizes. Pure lard is then opalescent but homogeneous. In the presence of 2 per cent. of paraffin the presence of flocculent separation imparts a characteristic clotted appearance to the mass.

Linimentum cajuputi et chloroformi compositum. H. Craig. (*Drugg. Circ.*, 1910, **54,** 29.) Oil of cajuput, 6; chloroform, 6; methyl salicylate, 12; soap liniment, enough to make 100.

Liquor antisepticus, C.F. (*Canad. P. J.*, 1910, **43,** 525.) Boric acid, 20 Gm.; benzoic acid, 1 Gm.; thymol, 1 Gm.; eucalyptol, 0·25 c.c.; oil of peppermint, 0·50 c.c.; oil of gaultheria, 0·25 c.c.; oil of thyme, 0·10 c.c.; alcohol 95 per cent., 250 c.c.; purified talcum, 20 Gm.; water sufficient to make 1,000 c.c. Dissolve the boric acid in 600 c.c. of water, and the benzoic acid in 150 c.c. of alcohol, and pour the aqueous solution into the alcoholic solution, then dissolve (in a mortar) the thymol in the eucalyptol and oils of peppermint, gaultheria and thyme; thoroughly incorporate the purified talcum, and add with constant trituration to the solution first prepared. Allow the mixture to stand with occasional agitation for forty-eight hours, filter, add 100 c.c. of alcohol to the clear filtrate, and a sufficient quantity of water to make the finished product measure 1,000 c.c.

Liquor antisepticus alkalinus ruber. J. L. Lascoff. (*Proc. Amer. Pharm. Assoc.*, 1907, **57,** 1137.) The following is claimed to be an improved formula, giving a preparation of definite colour: Sodium bicarbonate, 30 Gm.; borax, 30 Gm.; sodium salicylate, 12 Gm.; sodium benzoate, 4 Gm.; thymol, 0·3 Gm.; menthol, 1·2 Gm.; eucalyptol, 0·4 c.c.; oil of wintergreen, 0·3 c.c.; glycerin, 333 c.c.; alcohol 94 per cent., 40 c.c.; cudbear, 2 Gm.; talc, 10 Gm.; distilled water, to make 1,000 c.c. Dissolve the salts in water; the oils, thymol and menthol in the

alcohol (add the glycerin), macerate with the cudbear for twenty-four hours, and filter (through the talc).

Liquor arsenicalis and Liquor arsenici hydrochloricus, Relative Stability of. A. B. Lyons. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 904.) The solutions reported on last year (*Y.B.*, **1909,** 156) have again been examined; further progressive oxidation is found to have taken place in the alkaline preparations. Acid solutions of As_2O_3, on the contrary, are found to be practically stable. The amount of oxidation in eleven months of 1 per cent. solutions of As_2O_3, acidified with HCl and with H_2SO_4, amounted to only 0·01 per cent.; in solutions containing $NaHCO_3$ it reached 0·5 per cent.; and in those containing KOH 2·5 per cent. in the same period.

Liquor picis carbonis. O. Raubenheimer. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 1031.) The method of the B.P.C. is thus modified. The tincture of quillaia is prepared with alcohol 95 per cent., instead of 90 per cent. The coal tar is not "prepared." According to the author, valuable constituents are thus lost by volatilization. Ordinary coal tar is used. This is digested on the water-bath for one hour with the quillaia tincture, or for seven days in the cold.

Magma bismuthi. O. Raubenheimer. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 1030.) Bismuth subnitrate, 80 Gm.; nitric acid, 80 c.c.; ammonium carbonate, 20 Gm.; solution of ammonia, 400 c.c.; distilled water, to make 1,000 c.c. Mix the bismuth with 60 c.c. of water and 50 c.c. of HNO_3 and dissolve with gentle heat, if necessary. Pour the solution in a thin stream into 8,000 c.c. of water, previously mixed with 30 c.c. of HNO_3. Dilute the AmOH with water, 1,200 c.c., and dissolve the Am_2CO_3 in this. Then pour the Bi solution quickly into this. Test the mixture, and if not distinctly alkaline add more AmOH. Allow to stand for two hours, then decant the supernatant liquid and wash the precipitate three times with distilled water. The last washing should be done in a graduated bottle, and when the magma has subsided to 1,000 c.c. syphon off the supernatant liquid; 4 c.c. of the magma (1 fluid drachm) will then represent 0·3 Gm (5 grains) of bismuth subnitrate in the form of hydroxide with a little subcarbonate.

Magnesium Ammonium Sulphate, Solubility of. J. Lothian. (*Pharm. J.*, 1910, **30,** 546.) The author has determined the

solubility of this salt, at ordinary temperatures, actually and naturally occurring at different periods during the investigation. The results differ markedly from those found by Seidell, as follows :—

100 Gm. of water dissolve at— Temperature F.	Lothian found.	Seidell interpolated.
34°	18·22 Gm. $Mg(NH_4)_2(SO_4)_2, 6H_2O$	13·25 Gm.
41°	20·72 ,, ,, ,,	16·25 Gm.
50°	22·48 ,, ,, ,,	18·56 Gm.
59°	24·08 ,, ,, ,,	—
60°	24·81 ,, ,, ,,	22·50 Gm.
70°	28·26 ,, ,, ,,	26·00 Gm.
81°	33·33 ,, ,, ,,	29·75 Gm.

Magnesium Salts of the French Codex, 1908; Undue Stringency of the Tests for. A. Buisson. (*J. Pharm. Chim.*, 1909, **30,** 205.) It is maintained that the extreme stringency of the tests for magnesia, magnesium carbonate and magnesium sulphate increase the cost of these drugs in greatly undue proportion, without sensibly affecting their medicinal value. A series of more rational tests is given.

Malt Extract with Cod-Liver Oil. H. Craig. (*Drugg. Circ.*, 1910, **54,** 28.) Powdered chocolate, 2 ; hot water, 1 ; cod-liver oil, 10 ; extract of malt, 87. Make a paste of the chocolate with the hot water, and allow it to cool. Add the extract of malt gradually, triturating constantly ; then add the oil in divided portions, triturating well after each addition. This modification of the B.P. Codex formula is recommended for inclusion in the N.F.

Massa phosphori. J. D. A. Hartz. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 970.) Cacao butter, yellow wax, of each 15 Gm. Melt and strain into a dry test tube 24·75 Gm. of the mixture, add phosphorous 0·25 Gm. Fit a good stopper to the tube and shake until the P is dissolved, remelting again if needful. Transfer to a suitable tube fitted at the lower end with a cork, by means of which a portion of the mass may be pushed upwards with a plunger. This mass is serviceable for incorporating small quantities of P into pills.

Morphine Hydrochloride Solutions, Sterilization of. A. Lesure. (*J. Pharm. Chim.*, 1909, **30,** 337.) The alteration of solutions of morphine hydrochloride under the influence of heat is not due to such simple causes as has been supposed. The

action of light, of heat, of the alkalinity of glass, and of atmospheric oxygen have all to be considered. The influence of light is unimportant; it may accentuate the change, but it is not the initial cause. Temperature plays a more important part, and alteration is more pronounced as the temperature rises, as shown by the depth of colouration of the liquid. The alkalinity of the glass also plays an important part in the change. But it is impossible to heat morphine solution to 120°C. under pressure in any vessel of absolutely neutral glass, or even of silica, without some change of colour being evident. This is due to oxidation, oxymorphine being formed. This change is favoured by the presence of a minute trace of alkali. Consequently, a trace of free acid in excess of any alkalinity which may be derived from the glass should always be present in the solution. Air should be excluded from the containers, and the liquids employed in making the solutions should be air-free. The flasks before sterilization should be filled as full as possible, and then hermetically sealed. The change of the solution being mainly one of oxidation into oxymorphine, the importance of this elimination of air, as far as practicable, is self-evident. The author has been unable to find any indication of the formation of apomorphine as a decomposition-product of morphine solutions after sterilization and storing.

Ointments, Melting Points of. E. Thorp. (*Pharm. J.*, 1910, **30**, 204.) A glass tube of 5 mm. diameter and 3 cm. length graduated at 1 cm. is inserted into the cold ointment so as to fill it to the 1 cm. mark. The outside of the tube being cleaned, 0·5 Gm. mercury is dropped into the open end, the mercury resting on the column of ointment. The tube is then fastened by an elastic band to the bulb of a sensitive thermometer, and the whole suspended in a flask of cold water over a small Bunsen burner flame, and gently heated up. Directly the sample commences to melt the pressure of mercury forces the ointment out of the lower end of glass tube, and the temperature is read off. The following ointments examined by the above simple method yielded temperatures as indicated :—Ung. acid boric., 41–42°C.; ung. bellad., 35–36°C.; ung. cetacei, 40–41°C.; ung. acid. carbolic., 39–40°C.; ung. canthar., 48–49°C.; ung. eucalypti, 41–42°C.; ung. gallae, 34–35°C.; ung. gallae c. opio, 35–36°C.; ung. hyd. ammon., 39–40°C.; ung. hyd. ox. rub., 40–41°C.; ung. paraffin, 40–41°C.; ung. plumbi acet., 44–45°C.;

ung. resinae, 59–60°C.; ung. staphisagr., 43–44°C.; ung. sulphuris, 35–36°C.; ung. zinci, 35–36°C.

Oleoresins, Ether and Acetone as Solvents for. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 949.) Ether is considered to be preferable to acetone as a solvent for extracting oleoresins. Thus, male fern yields much less undesirable extractive to ether than to acetone.

Ointment, Mercurial. A. Boerner. (*Apoth. Zeit.*, 1909, **24**, 887.) Mercury, 300; anhydrous wool fat, 45; castor oil, 45; are introduced into a strong bottle, heated on the water-bath, then shaken until cold. This is repeated twice daily, until the mercury is killed. The mixture is then rubbed down in a mortar with lard 310, suet 200, previously melted and almost cold. The consistence of this ointment is soft enough to permit its introduction into tubes. The absorbent action of mercurial ointment is greatly increased by the presence of ammonium oleate. An ointment containing this may be prepared thus: Lard, 60; or lard and white vaseline, of each 30; oleic acid, 30; alcoholic solution of ammonia, 10. Mix and heat together on the water-bath until the alcohol is driven off, then add sufficient of the above killed mercury to give an ointment containing 33 per cent. of Hg.

Ointments and Applications for Itch. L. Brocq. (*L'Union pharm.*, 1910, **51**, 207.) Hardy's modification of *Helmerich's ointment* is of general use, especially in hospital practice. It is thus prepared: Sublimed sulphur, 2; potassium carbonate, 1; lard, 12. *Bourgingnon's application* is also useful for general practice. Its formula is: Oil of lavender, oil of cinnamon, oil of peppermint, oil of cloves, of each 2; gum tragacanth, 4; potassium carbonate, 30; flowers of sulphur, 90; glycerin, 180, by weight. *Besnier's ointment* is also valuable: Lanoline, vaseline, of each 10; potassium carbonate, 1; precipitated sulphur, 4. These sulphur preparations should be left on the affected area as long as they can be borne, for twenty-four hours if possible. When they occasion too much irritation, they should be removed by means of some of the plain excipient with which they are prepared, and the parts should be washed with boiled water; a bran or starch bath may be advantageously given. The parts should then be dressed with zinc paste composed of ZnO, vaseline, lanoline, equal parts; or cold cream may be used.

For infants *Brocq* employs the following application : Olive oil, 15 ; resin, 18 ; elemi, yellow wax, liquid storax, of each 10. This ointment is diluted with about five times its volume of oil before application. The storax met with in pharmacy since 1895 sometimes occasions irritation, although, before this date, it never caused this. Consequently the following oil is now prescribed : Infused oil of chamomile, 10 ; storax, 2. Infants may also be treated daily with a lotion of 1 : 1000 solution of sulphurated potash, then with the following ointment : Precipitated sulphur, 2 ; zinc oxide, lanoline, of each 6 ; vaseline, 8. If it does not cause irritation, Peruvian balsam 2, may be added to this formula. If this does not effect a cure, the intact burrows are to be opened up, washed with the sulphurated lotion, and treated with Helmerich's ointment, cautiously applied only to the affected spots.

Ointments, Anhydrous Wool-fat for, with Moist Precipitates. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 949.) Anhydrous wool-fat may be advantageously mixed with many chemicals in the form of moist precipitates instead of using dry powders and hydrous wool-fat. For instance, ammoniated mercury magma containing 12 of water may be mixed with anhydrous wool-fat 28, instead of hydrated wool-fat 40 and the dry precipitate.

Ointments of Moist Mercurous and Mercuric Iodide. — Ammon. (*Pharm. Zentralh.*, 1910, **51**, 192 ; *Muench. Med. Woch.*, 1910, 473.) *Mercurous iodide ointment*: Mercurous nitrate, 2·1 Gm., is gently rubbed down with water, 500 c.c., and the solution filtered. This is then poured into a warm (50°C.) solution of KI, 1·32 Gm. in water, 250 c.c. in a glass cylinder. The precipitated mercurous iodide is then washed thoroughly by decantation, until the washings give no reaction for Hg or HNO_3, and the residue is decanted into a small tared porcelain capsule. The aqueous liquid is further decanted until the moist precipitate weighs 13 Gm. This is then mixed with 12 Gm. of anhydrous wool-fat. The product will be 25 Gm. of ointment containing 10 per cent. of mercurous iodide. By incorporating one part of this with 1 part of anhydrous lanoline and 8 parts white vaseline, the 1 per cent. ointment is obtained.

Mercuric iodide ointment: A solution of KI 1·5 Gm. in water 400 c.c. is added to a warm (50°C.) solution of mercuric chloride 1·2 Gm. in water 200 c.c. The pinkish precipitate slowly

subsides, is washed by decantation and treated as above. The drained precipitate and water should weigh 5·5 Gm., which is then rubbed down with 14·5 Gm. of anhydrous wool-fat. The 10 per cent. ointment thus obtained can be diluted as required to the prescribed strength.

Orange, Sweet, Pharmaceutical Preparations of. Peter Boa. (*Pharm. J.*, 1910, **30,** 243.) Fresh peel from the sweet orange yields a flavour pure and simple. In extracting this, the use of dilute alcohol, such as was recommended for bitter orange, is suggested (*Y.B.*, **1909,** 162). *Tincture of sweet orange peel*: Fresh sweet orange peel, cut small, 20 oz. or 25 oz.; alcohol 90 per cent., 52 fl. oz.; distilled water, 48 fl. oz.; prepare by the maceration process. Twenty oz. of peel is sufficient, but to accord with the corresponding official formula, 25 oz. is given as an alternative. With good peel the tincture is practically saturated with 4 oz. to a pint of menstruum. *Syrup of Sweet Oranges*: Tincture of sweet orange, as above, 1 fl. oz.; syrup, 7 fl. oz.; mix. *Acid Syrup of Sweet Orange*: Citric acid, 2 oz.; sugar, 5¼ lb.; distilled water, 42 fl. oz. or q.s.; tincture of sweet orange, as above, 5 fl. oz. Heat the water to boiling-point, add first the sugar, then the citric acid. When cold, add the tincture and mix by shaking. Finally add sufficient distilled water to make the product measure 100 fl. oz. *Aromatic Syrup*: Fresh sweet orange peel, cut small, 12½ oz.; alcohol 90 per cent., 52 fl. oz.; cinnamon water, 48 fl. oz. Prepare a tincture by the maceration process, filter, and add an equal volume of syrup. The official recognition of sweet orange peel is advocated.

Organo-therapeutic Remedies, Preparation of. E. Choay. (*J. Pharm. Chim.*, 1909, **30,** 398, 433.) A long series of experiments show that it is essential that only those organic extracts and preparations which have been prepared by the immediate desiccation of the freshest organs, *in vacuo*, at low temperatures are fit for medicinal use. With all other methods of drying or preparing profound internal change, or autolysis, rapidly take place; degrading the active constituents and producing substances which may give rise to bad results.

Pancreatic Extract, Action of Heat on. E. Choay. (*J. Pharm. Chim.*, 1910, **1,** 10.) The pancreatic diastases in the moist condition are very sensitive to the action of heat. An exposure to 40° or 50°C. under reduced pressure, such as is

employed in the commercial preparation of dry pancreatic products, destroys 75 per cent. of the activity of the amylolytic diastase and 50 per cent. of that of the steaptasic ferment. When perfectly dry, however, the trypsin, amylopsin, and steapsin all three withstand exposure to 80° or 100°C. for 1 or 2 hours without showing any material diminution of their activity. If the dry ferments are heated to 120°C., their action is paralysed, and the amount of inhibition is directly proportioned to the time of exposure.

Petrolatum benzoinatum liquidum. J. and A. Hartz. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 970.) Benzoin, in very fine powder, 2; white liquid petrolatum, 1,000. Macerate for two weeks, with frequent shaking, then filter.

Phosphorized Oil, Reputed, Action of Limonene as a Preservative for. P. Bohrisch. (*Pharm. Zentralh.*, 1909, **50,** 618; *Schimmels' Report*, Oct., 1909, 66.) Bohrisch states that limonene from orange oil alone is effective for preventing the oxidation of P in phosphorized oil. That obtained from caraway oil is inert. Schimmels' consider this action to be due, not to the orange oil limonene, but to some accompanying impurity. Bohrisch further states that limonene is insoluble in paraffin oil. This is incorrect. It is soluble in petroleum in all proportions. Any turbidity which appears when these are mixed is due to the presence of water.

Plasters, Assay of. F. B. Kilmer. (*Amer. J. Pharm.*, 1910, **82,** 112.) *Belladonna Plasters*: For belladonna plasters the assay method of the eighth revision of the United States Pharmacopœia is recommended.

Salicylic Acid Plaster: Weigh out accurately about 5 Gm. of the plaster cut into small strips. Place the weighed strips of plaster in a 150 c.c. beaker (No. 1). Add to it 50 c.c. of $CHCl_3$. Stir gently until all the compound is dissolved from the plaster-cloth. Pour the syrupy solution into another similar beaker (No. 2). Add to this 40 c.c. ordinary 94 per cent. EtOH, stir thoroughly to precipitate and coagulate the rubber, then allow it to stand. Pour off all possible of the liquid into a glass stoppered graduated 250 c.c. flask. The rubber should be worked up into a compact mass, so that no particles are carried over when the liquid is poured off, and all possible liquid should be pressed out of the mass with a glass rod. To the plaster-cloth in beaker

No. 1 add 25 c.c. $CHCl_3$. Stir carefully and thoroughly until all the remaining plaster-mass is dissolved from the cloth and sides of the beaker. Again pour off the solution into beaker No. 2, which contains the precipitated rubber. Work up with a glass rod until all of the rubber mass is again in solution in the $CHCl_3$. Now reprecipitate the rubber from this solution with 20 c.c. EtOH, working up with rod and pouring off as before, mixing the fluid with the first portion in the flask. Once again wash the cloth in beaker No. 1, with 25 c.c. of $CHCl_3$. Pour off into No. 2 beaker, dissolving again the rubber mass in it. Reprecipitate the rubber from it with 20 c.c. EtOH as before, pour off and mix the decanted fluid with the other two portions in the flask, which now contains all of the salicylic acid, in solution. Fill the flask up to the 250 c.c. mark with EtOH. Remove the cloth, which should now be white and clean, from beaker No. 1, allow it to dry spontaneously, and weigh. Subtract its weight from the total weight of plaster used, thus ascertaining the weight of plaster compound taken for assay.

Standard Salicylic Acid Solution: Weigh out exactly 0·5 Gm. pure salicylic acid and dissolve it in 50 per cent. EtOH. Transfer to a 500 c.c. glass-stoppered graduated flask, rinse out the vessel in which the acid was dissolved with repeated portions of 50 per cent. EtOH, adding each portion to the solution in the flask. Make up to the 500 c.c. mark with 50 per cent. EtOH; shake thoroughly. One c.c. of this solution contains 0·001 Gm. salicylic acid.

Analysis by Colour Comparison: For this work two large twin test tubes (or Nessler glasses) are used. Place these tubes side by side. In a beaker place 100 c.c. distilled water, to which add 1 drop Fe_2Cl6 solution, U.S.P. Stir the liquid and pour into each of the test tubes 50 c.c. of it. Designate them No. 1 and No. 2. Now add to No. 1 tube from burette sufficient of the standard salicylic acid solution to give a strong clear wine colour. Stir with a glass rod after each addition of the acid solution. Multiply number of c.c. used by 0·001, which will give the weight in grammes of salicylic acid used in tube No. 1—the standard. Now add to tube No. 2 from another burette sufficient of the plaster solution exactly to match the colour obtained in tube, No. 1. This plaster solution must be added a little at a time, and the solution in the test-tube well stirred with a glass rod after each addition. When the matching point is nearly reached, it may be necessary to filter off the

contents of the test-tube No. 2. Clean the tube and replace the fluid, proceeding thereafter to add the plaster solution a drop at a time. The reason for doing this is that the small amount of resinous matter separated from the solution may cloud the mixture in No. 2 test-tube and interfere with the colour judgment. From the data thus obtained the amount of acid in the original plaster is calculated.

Mercurial Plaster and Mercury and Ammoniacum Plaster.—Weigh out about 5 Gm. of the plaster, cut it into small strips. Place these in a beaker and add about 50 c.c. C_6H_6. Stir well for some time to soften and dissolve the compound. Pour the solution off into a 200 c.c. beaker, allowing the cloth to remain in the first beaker. To the cloth in the first beaker add repeated portions of about 50 c.c. C_6H_6, stirring well and pouring off each time into the second beaker until the mixed solutions amount to about 200 c.c. The clean cloth is now allowed to dry in the air, weighed, and its weight subtracted from the weight of the plaster taken. This gives the weight of the compound used.

The mixed solutions of the compound, measuring about 200 c.c., are now well stirred and then allowed to stand covered in a tall beaker until all the grey metallic mercury has settled to the bottom. This usually is accomplished in about 24 hours. $CHCl_3$ can be substituted for C_6H_6. When the grey mercury has settled out pour off carefully the supernatant C_6H_6. Dissolve the residual Hg in 1 or 2 c.c. of aqua regia, warm it, stir, and let stand. If all grey colour is not removed in about an hour add another c.c. of aqua regia, repeating the operation, if necessary, to dissolve all of the mercury. Use, however, as little acid as possible. When the acid solution has lost all grey colour, add about 50 c.c. water. Stir, and filter through a paper filter containing a tuft of absorbent cotton. The cotton catches the flocculent particles of resinous matter and prevents stoppage of the filtration by clogging. Wash with water until about 200 c.c. of filtrate is secured. Place this in an Erlenmeyer flask, pass H_2S through it until the Hg is precipitated as HgS. Collect on a tared filter, wash with a little water, dry at 100°C., cool, and weigh. From this weight the percentage of Hg in the plaster can be calculated.

Strengthening Plaster.—Assay for Iron: Weigh out accurately two pieces of plaster of about 5 Gm. each, cutting them side by side from the same piece in order that the relative amount of compound to cloth will be the same in each piece. Dissolve

off the compound from one of the pieces with repeated portions of $CHCl_3$ until the cloth is clean. Allow the cloth to dry spontaneously and weigh it. The difference gives the amount of plaster. The second piece of plaster of known exact weight is placed in small clippings in a porcelain crucible and ignited. Dissolve the residue in warm strong HCl. From this the iron is precipitated in the usual manner with AmOH, collected, ignited and weighed as Fe_2O_3. The amount of plaster having been found in the previous determination, the percentage of iron is calculated therein from the data thus obtained.

Resorcin Ointment, Compound. A. Wernstein. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 1131.) Resorcinol, 6; zinc oxide, 6; bismuth subnitrate, 6; crude oil of birch tar, 6; white wax, 10; white petrolatum, 28; hydrous wool-fat, 38. Rub down the powders with part of the previously melted wax, petrolatum and wool-fat; add the rest and stir until cool.

Salol, Behaviour of, when mixed with other Solids. R. J. Wotring. (*Amer. J. Pharm.*, 1910, **82,** 241.) Salol may be mixed with *menthol* in the proportion of 1 mol. salol to 3 mols. menthol; also in the proportion of 3 mols. salol: 2 mols. menthol to form a dry powder. But 2 mols. salol: 3 mols. menthol give a damp powder. Equal mols. of salol and menthol liquefy when mixed. Salol and *camphor* form either pasty masses or liquids when mixed. Salol forms dry powders with *phenacetin,* with *antipyrine,* and with *salicylic acid*; but the addition of a little camphor to either mixture causes liquefaction. Salicylic acid and camphor alone form a dry powder. Three mols. salol: 1 mol. *thymol*; or 1 mol. salol: 3 mols. thymol, form pasty mixtures; in other proportions they liquefy. Either 1 mol. or 3 mols. salol: 2 mols. *chloral hydrate* form moist powders; in other proportions a dry mixture results. Salol and *resorcinol* in different proportions form dry powders; so does *acetanilide* with salol; but the addition of antipyrine to the mixtures causes liquefaction. Salol gives dry mixtures with *β-naphthol,* with *pyrogallol* or with *sodium salicylate.* Although salol and antipyrine, or salol and resorcinol form dry mixtures, when all three are mixed a pasty mass results.

Sapo cresolis. R. C. Cowley. (*Pharm. J.*, 1909, **29,** 202.) Olive oil, by weight, 20; caustic potash, 5·75; water, 5; alcohol (methylated), by weight, 10; cresylic acid, by weight,

50. Dissolve the KOH in the water and alcohol, and heat the solution with the olive oil, until saponification is complete and a clear liquid is obtained, then add the cresylic acid. The product is a clear saponaceous liquid, quite soluble in water and neutral to phenolphthalein. It is well to prepare it from a cresylic acid that has not been unduly exposed to air, as this not only causes the acid to darken in colour, but causes a certain amount of resinification, especially in hot climates.

Sesame Oil in Pharmacy. G. P. Forrester. (*Chem. and Drugg.*, 1910, **76,** 581.) The Pharmacopœias of Austria, Holland, and Hungary have to the largest extent replaced the use of olive oil by that of sesame oil in the preparation of plasters, liniments, medicinal oils, and ointments. In every country in which the oil is official it is employed in the preparation of liniment of ammonia. The following are some of the most important preparations of different Pharmacopœias into which sesame oil enters as an ingredient (all parts by weight) :

Empl. saponatum (Coatia-Slavonia) : Emp. plumbi, 450; cerae alb., 75; sapon. duri, 38; camphorae, 8; ol. sesami, 15. *Liniment. ammoniatum* (Russia) : Ol. olivae, 3; ol. sesami, 1; liq. ammon., 1. Switzerland: Ol. sesami, 75; liq. ammon., 25. *Linimentum calcariae* (Japan) : Lime-water, sesame oil, of each equal parts. *Ol. camphoratum* (Hungary): Camphor, 25; ol. sesami, 75; sod. sulph. sicc., 8; filter. *Ung. acidi borici* (Hungary): Paraffin. solid, 50; cerae alb., 30; ol. sesami, 300; melt together and add a previously prepared solution of boric acid 25 in glycerin 75. *Ung. cantharid. pro usu veterinar.* (Hungary): Cantharidis, 40; ol. sesami, 70; cerae flav., 30; terebinthinae liq., 40; euphorbi, 10. *Ung. adipis lanae* (Hungary): Adipis lanae anhyd., 100; aquae, 25; ol. sesami, 25. *Ung. emolliens* (Hungary): Cerae alb., 20; cetacei, 40; ol. sesami, 160; ol. rosae, gtt. j. *Ung. leniens* (Austria): White wax, 8; spermaceti, 15; sesame oil, 62; water, 15. Add ol. rosae gtt. ij. to every 100 grams. *Ung. leniens* (Holland): Cerae flavae, 5; cetacei, 10; adipis lanae, 10; ol. sesami, 50; aq. rosae, 25. *Ung. rosatum* (Croatia-Slavonia): Oil of theobroma, 20; sesame oil, 40; rose-water, 10. *Ung. zinci* (Austria): Lard, 63; benzoin, 3; white wax, 15; zinc oxide, 15; sesame oil, 7.

Soaps, Surgical. —Lemaire. (*J. des Pract.; Répertoire*, 1910, **22,** 104.) The author employs the following *antiseptic*

soap: Olive oil soap, 20; alcohol 90 per cent., 10; glycerin, 10; formalin, 1; tincture of eucalyptus sufficient to perfume. The soap is dissolved in the alcohol by heat; the other ingredients are added and the liquid is run into a mould. It sets to a translucent mass. If desired more alkaline, a drop of NaOH solution may be added. Other formulae are: (1) White hard soap, 10; alcohol, 10; water, 12. (2) Hard soap, 38; glycerin, 50; distilled water, 500. To make a solution. (3) Hard soap, 100; soft soap, 100; water, 5,000; β-naphthol, 2·5; oil of lemon, sufficient to perfume. *Lubricant soap for rectal exploration*: Powdered soap, 100; phenol, 1; cocaine hydrochloride, 2·5; glycerin and water, of each sufficient to form a semi-fluid mass.

Soluble Ferric Phosphate, Green. J. A. Dunn. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 948.) The following formula will give a green scale preparation. Solution of ferric sulphate, 135 Gm.; caustic soda, U.S.P., 50 Gm.; sodium phosphate, 76 Gm.; citric acid, 53·5 Gm.; water, q.s. Dilute the ferric sulphate with water, 300; dissolve the caustic soda in the same quantity of water; pour the dilute iron solution rapidly into the alkali, constantly stirring; fill up the vessel with water, and wash the precipitate by decantation; collect and drain. Dissolve the citric acid and Na_2HPO_4 in just enough water; add the $Fe_2 6(OH)$ gradually to this solution; let stand for about 24 hours, and warm to about 60°C. When solution is complete, filter, concentrate to a syrup, spread on plates and scale, without heat.

Solubility, Proposed Definitions for, Different Degrees of. M. I. Wilbert. (*Amer. Drugg.*, 1909, **55**.) The method of expressing the solubilities of chemicals in the U.S.P. (and similar works) is criticized. It is suggested that for all practical purposes the use of certain qualitative expressions, if adequately defined, would suffice, and some concerted attempt should be made to confine the definitions of the several terms to readily remembered limitations. Thus, for all ordinary purposes a list of definitions somewhat as follows might be included in the official text.

Articles that are soluble in less than—
1 part of solvent = very soluble.
From 1 to 10 parts of solvent = freely soluble.
From 10 to 100 parts of solvent = soluble.
From 100 to 1,000 parts of solvent = slightly soluble.

From 1,000 to 10,000 parts of solvent = very slightly soluble.
From 10,000 to 100,000 parts of solvent = nearly insoluble.
More than 100,000 parts of solvent = practically insoluble.

The same definition might be stated in another form, thus: 100 c.c. of solvent will dissolve

100 Gm. or more of a "very soluble" substance.
10 to 100 Gm. of "freely soluble" substance.
1 to 10 Gm. of a "soluble" substance.
0·1 to 1 Gm. of a "slightly soluble" substance.
0·01 to 0·10 Gm. of a "very slightly soluble" substance.
0·001 to 0·01 Gm. of a "nearly insoluble" substance.
Less than 0·001 Gm. of a "practically insoluble" substance.

Exact, or more nearly exact, information regarding solubilities might be tabulated, as in the Belgian Pharmacopœia, in the Appendix, and would, in this form, be an incentive for concerted effort to correct, and, if possible correlate, the data concerning solubilities. As an illustration of the need for such work, but a single illustration is needed, the solubility of such a well-known substance as acetanilide in cold water and in cold alcohol, as given in twelve more or less well-known authoritative books.

Sol. in	U.S.P.	B.P.C.	Ph. Brit. Ph. Hisp.	Ph. Ned.	Ph. Helv. Codex.	Ph. Germ. Ph Belg. Ph. Dan. Ph. Svec.	Ph. Austr
Water ..	179	190	200	210	220	230	250
Alcohol ..	2·5	4·0	3·5	3·6	3·5	3·5	3·5

Soya Bean Oil, Application of, in Pharmacy. W. B. Cowie. (*Pharm. J.*, 1910, **30**, 403.) This fixed oil, which is now reaching the country in considerable quantity from Manchuria, and has attracted much attention in the soap and oil industries, was substituted for olive oil in the following official preparations: Liniments of ammonia, lime, and camphor, and nitrate of mercury ointment. The liniments were presentable, particularly that of camphor, but the others were not so white as when prepared with the official oils; they have shown no tendency to solidify. The ointment was a complete failure, and of a chocolate brown colour, due to the linolic acid present in the oil. The oil in question had the following characters: Sp. gr. at 15°C., 0·9253; $\eta_{D25°C}$. 1,457; acid value, 2·24; saponification value, 196; iodine value, 131.

Sterilization with Boiling Alcohol, Influence of in the Preparation of Certain Alcoholic Galenicals. M. Lesueur.

(*J. Pharm. Chim.*, 1909, **30**, 49; 1910, **1**, 239, 285.) The author has experimented with the strong mother tinctures of fresh herbs, the alcoholatures of the French Codex, and also tinctures made with dried material prepared simultaneously by the official process with cold alcohol, and also with boiling alcohol. In the case of *Cherry laurel leaves*, typical of a drug containing an active enzyme and a cyanogenetic glucoside, the use of hot alcohol, as might be expected, gives a much more active preparation in the case of the alcoholature of the fresh leaves. The tincture of the dried leaves, prepared with cold alcohol, also contains less unaltered glucoside than that prepared with boiling spirit. In the case of *colchicum corms* also, the alcoholature prepared with boiling alcohol and fresh material contains more colchicine determined by Katz-Linde's method (*Y.B.*, **1904**, 67) than that made with cold alcohol, from a portion of the same lot of corms. In the case of tinctures, however, there is no marked difference in the preparations made with hot and cold alcohol, respectively.

Sulphurous Acid, Preservation of, by means of Glycerin. E. J. Brown. (*Pharm. J.*, 1910, **30**, 244.) The addition of 5 per cent. of glycerin is found to materially lessen the loss of strength of sulphurous acid on keeping. A sample (A) of sulphurous acid was taken and found to contain 3·8 per cent. SO_2. To a portion (B) was then added 5 per cent. glycerin. The estimation of (B), after addition of glycerin, gave 3·6 per cent. SO_2. Similar quantites of (A) and (B) were stored in stoppered bottles three-fourths filled, and set in similar positions, and occasionally opened. At the end of twelve months the results of estimation showed: A = 1·5 per cent. SO_2; B = 3·1 per cent. SO_2.

Suppository Bases. H. A. B. Dunning. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 1142.) As the result of experiments, the author suggests that for use in summer time, and when a large percentage of solid extracts is dispensed, a base composed of cacao butter containing castor oil 10 per cent., and white wax 2½ per cent., is more satisfactory than cacao butter alone. This mixture melts at body temperature and spreads quite freely.

The examination of some suppositories in the following combinations, cacao butter, adrenine, water; cacao butter, dilute HCl, water; cacao butter, adrenine, dilute HCl and water, seems to show that the addition of one-twenty-fourth grain of adrenine

to a 30-grain suppository increases the resistance of cacao butter to heat and prevents the suppository from melting freely at the body temperature.

Syrups made with Glycerin. H. B. Hammond and J. H. Meadowcroft. (*Pharm. J.*, 1909, **29**, 389.) A mixture calling for equal volumes of *Syrup. ferri phosph. c̄. Quin. et Strych.* and *Syrup. ferri iodid.* was found on standing to throw down a dense precipitate in a week, when diluted, and when undiluted a slight precipitate in a partially filled bottle in a fortnight, gradually increasing in amount. Syrups made from "liquors" were found to precipitate most freely, whereas those made with glycerin only were the most compatible. A table is given showing that the dilutions precipitated in all cases, but it was found that the precipitation could be entirely prevented, in both dilute and undiluted form, by the addition of a trace of hypophosphorous acid to the *Syr. ferri iodidi.* The precipitates in the diluted mixtures were of an amorphous appearance, whereas, those in the undiluted form in crystals of a quarter of an inch in length were common, the growths presenting a very fine appearance. As the precipitates consist of the iodides of quinine and strychnine, it is obvious that the mixture is a very dangerous one, especially in the undiluted form, since the crystals do not readily diffuse and are liable to be taken entirely in the last dose.

It may safely be held that glycerin is a decided advantage in the preparation of these syrups, for not only does it prevent precipitation, but the keeping properties are found to be much better. Where the syrup made from liquors had discoloured in a few days, and the B.P. syrups in two weeks, those made with glycerin were in a fair state of preservation at the end of two months.

Syrups from Fluid Extracts. E. F. Cook and F. G. Ebner. (*Proc. Amer. Pharm. Assoc.*, 1909, **57**, 1004.) (Although the following notes apply to U.S.P. syrups, they may be suggestive to British pharmacists.) *Syrup of Krameria*: Fluid extract of krameria, 250 c.c.; sugar, 635 Gm.; water to make, 1,000 c.c. Dilute the liquid extract with water, 350, set aside for 24 hours; filter, and wash to obtain 600 c.c. of filtrate. Dissolve the sugar in this by agitation and make up to 1,000 c.c. with water. It may also be made by percolating the sugar with the fluid extract and water. ***Syrup of Senega*:** Fluid extract of senega, 200 c.c.;

magnesium carbonate, 10 Gm.; sugar, 680 Gm.; water, to make 1,000 c.c. Rub the fluid extract in a mortar with the $MgCO_3$; add water, 350 c.c., and mix; set aside for 24 hours, then filter and wash to obtain 560 c.c. Then proceed as above. *Syrup of Senna*: Fluid extract of senna, 250 c.c.; oil of coriander, 5 c.c.; potassium carbonate, 10 Gm.; sugar, 635 Gm.; water to make 1,000 c.c. Mix the oil with the fluid extract, dilute this with water, 360, in which the K_2CO_3 has been previously dissolved. Set aside for 24 hours; filter and wash to obtain 620 c.c. of filtrate. Then proceed as above. The K_2CO_3 prevents the formation of a precipitate.

Syrups, Improved Formulae for. G. M. Beringer and G. M. Beringer, jun. (*Amer. J. Pharm.*, 1909, **81**, 311.) *Syrupus Aurantii* (U.S.P.).—Tincture of sweet orange peel, 50 c.c.; citric acid, 5 Gm.; glycerin, 100 c.c.; simple syrup to make 1,000 c.c. Dissolve the acid in 500 c.c. of syrup with the glycerin. Then make up to 1,000 c.c. with more syrup.

Syrupus Ipecacuanha (U.S.P.).—Powdered ipecac., 70 Gm.; acetic acid, 10 c.c.; glycerin, 100 c.c.; sugar, 750 Gm.; water, a sufficient quantity. Percolate the ipecac. with a mixture of the acetic acid, glycerin, and 290 c.c. of water, and then continue the percolation with water till 600 c.c. of percolate is obtained. In this dissolve the sugar, add sufficient water to make the product measure 1,000 c.c.

Syrupus Krameriae (U.S.P.).—Krameria (No. 20 powder), 450 Gm.; glycerin, 225 c.c.; sugar, 650 Gm.; water, a sufficient quantity. Mix the glycerin with 675 c.c. of water and percolate the krameria with this mixture, and then continue percolation with water till the drug is extracted, evaporate the percolate to 650 c.c. and in this while still warm dissolve the sugar. Strain the liquid and add sufficient distilled water to make 1,000 c.c. of product.

As an alternative formula: Fluid glycerate of krameria, 450 c.c.; syrup, 550 c.c.; mix. Either of these formulas yields a clear liquid, which keeps fairly well without gelatinizing or precipitating.

Syrupus Pruni Virginianae (U.S.P.).—It is suggested that the present official method be modified to direct the moistened powder to be packed and macerated in the percolator for 24 hours with sufficient water to keep it submerged, and that the

percolation be then continued until the liquid in the receiving vessel containing the glycerin measures at least 600 c.c.

Syrupus Rhei (U.S.P.).—Rhubarb (No. 20 powder), 100 Gm.; potassium carbonate, 10 Gm.; glycerin, 50 c.c.; sugar, 800 Gm.; cinnamon water, a sufficient quantity. Mix the rhubarb with 250 Gm. of clean sand and moisten with 50 c.c. of a mixture of the glycerin and 150 c.c. of cinnamon water, transfer to a percolator, and extract, using the remainder of the menstruum and then cinnamon water till 600 c.c. of percolate is obtained. To this add the potassium carbonate and then the sugar, using a water-bath heat to dissolve, and strain and add cinnamon water, if necessary, to obtain 1,000 c.c. of product.

Syrupus Sarsaparillae (U.S.P.).—Sarsaparilla (No. 20 powder), 200 Gm.; glycyrrhiza (No. 20 powder), 15 Gm.; senna (No. 20 powder), 15 Gm.; glycerin, 125 c.c.; sugar, 750 Gm.; oil of sassafras, 0·2 c.c.; oil of anise, 0·2 c.c.; oil of sweet birch, 0·2 c.c.; water, a sufficient quantity. Add the glycerin to 375 c.c. of water, and having thoroughly mixed the ground drugs, moisten with 225 c.c. of this menstruum and pack in a percolator. Allow to macerate for 6 hours, then percolate, using the remainder of the menstruum, and then water till 600 c.c. of percolate is obtained. In this dissolve the sugar by heat. Allow to cool, strain, add the oils, thoroughly incorporate by agitation, and then add sufficient water to obtain 1,000 c.c. of product.

Syrupus Scillae Co. (U.S.P.).—Squill (No. 20 powder), 80 Gm.; senega (No. 20 powder), 80 Gm.; antimony and potassium tartrate, 2 Gm.; acetic acid, 20 c.c.; glycerin, 100 c.c.; sugar, 700 Gm.; water, a sufficient quantity. Mix the drugs and moisten with sufficient of a mixture of the glycerin, acetic acid, and 300 c.c. of water. Place loosely in a percolator, cover; and allow to macerate for 24 hours. Then shake down so as to pack *lightly* and proceed to percolate, using the remainder of the menstruum, and then water until exhausted. Reserve the first 500 c.c., evaporate the remainder to 100 c.c., in which dissolve the tartar emetic; when cold, filter into the reserve and then dissolve the sugar by agitation. Strain if necessary, and make up to 1,000 c.c. with water.

Syrupus Senegae (U.S.P.).—Senega in No. 20 powder, 200 Gm.; solution of ammonia, 20 c.c.; glycerin, 100 c.c.; sugar, 750 Gm.; water to make 1,000 c.c. Mix the ammonia and glycerin with water 200; moisten the drug with some of the mixture. Pack lightly in a percolator, macerate for 24 hours, then percolate on

to the sugar until 800 c.c. have been collected, using first the mixture, then water. Reserve this. Continue percolation to exhaustion, evaporate the second percolate to 200 c.c. and add it to the reserve. Shake until the sugar has dissolved, strain and add water to make 1,000 c.c.

Syrup. Glycyrrhizae (N.F.).—Fluid glycerate of licorice, 250; simple syrup, 750; mix.

Syrupus Papaveris (N.F.)—Poppy capsules (unripe and deprived of seed in No. 20 powder), 100 Gm.; sugar, 800 Gm.; water, a sufficient quantity. Add the poppy capsules to 1,500 c.c. boiling water. Allow the infusion to stand for 2 hours and then express. Again infuse the dregs with 500 c.c. boiling water and after 2 hours express. Mix the expressed liquids and evaporate to 500 c.c. Then filter and dissolve in the filtered liquid the sugar by heat. Add sufficient water to obtain 1,000 c.c. of the product, and strain.

Syrupus Pini Strobi. Co. (N.F.).—White pine bark, 85 Gm.; wild cherry, 85 Gm.; spikenard root, 10 Gm.; Balm of Gilead buds, 10 Gm.; sanguinaria, 8 Gm.; sassafras bark, 7 Gm.; cudbear, 1 Gm.; morphine sulphate, 0·5 Gm.; chloroform, 6 c.c.; sugar, 650 Gm.; glycerin, 100 c.c.; oil of sassafras, 0·2 c.c.; alcohol and water, of each a sufficient quantity. Reduce the vegetable drugs to a coarse powder and thoroughly mix them. Moisten the powder with a menstruum composed of the glycerin, 100 c.c. of alcohol, and 200 c.c. of water, pack in a percolator, and macerate for 12 hours. Then percolate, using first the remainder of the menstruum and then a mixture of alcohol 1 volume to water 3 volumes, till 650 c.c. of percolate is obtained, in which dissolve the sugar and the morphine sulphate, lastly add the chloroform and oil of sassafras, agitate thoroughly, add sufficient water to obtain 1,000 c.c. of product, and strain.

Syrupus Rhamni (N.F.)—Buckthorn berries, ground, 200 Gm.; sugar, 800 Gm.; oil of fennel, 0·2 c.c.; oil of cassia, 0·2 c.c.; water, a sufficient quantity. Add the ground buckthorn berries to two litres of boiling water, infuse for 2 hours, and then express. Infuse the dregs with 500 c.c. boiling water, and express when cold. Mix the expressed liquids, filter and evaporate to 600 c.c., in this dissolve the sugar by heat when cold, strain and make up to 1,000 c.c. with water. An alternative method is the following: Fluid extract of buckthorn berries, 200 c.c.; oil of fennel, 0·2 c.c.; oil of cassia, 0·2 c.c.; syrup to make 1,000 c.c.

Fluid Extract of Buckthorn Berries may be prepared as follows: Ground buckthorn berries, 1,000 Gm.; alcohol, 250 Gm.; water, a sufficient quantity. Add the ground buckthorn berries to five litres boiling water, allow to infuse for 2 hours, and then express. Again infuse the marc with three litres of boiling water and express. Mix the expressed liquids, and evaporate to 750 c.c. When cold add 250 c.c. alcohol and allow to stand for a few days, then filter, and wash the filter with sufficient of a mixture of alcohol 1 volume, water 3 volumes, to make 1,000 c.c. Or a very satisfactory fluid extract can also be prepared by the U.S.P. method, using diluted alcohol as the menstruum, and reserving the first 850 c.c. of percolate to each litre of product. Percolation with weaker alcohol was not practical owing to the gummy character of the drug.

Syrup of White Pine Compound with Codeine and Tar. F. W. Nitardy. (*Amer. Drugg.*, 1910, **56,** 106.) White pine bark in No. 20 powder, 85 Gm.; wild cherry bark in No. 20 powder, 85 Gm.; spikenard root in No. 20 powder, 10 Gm.; balm of Gilead buds in No. 20 powder, 10 Gm.; sanguinaria root in No. 20 powder, 8 Gm.; sassafras bark in No. 20 powder, 7 Gm.; pine tar, 10 Gm.; magnesium carbonate, 10 Gm.; codeine phosphate, 2 Gm.; chloroform, 6 c.c.; glycerin, 100 c.c.; sugar, 500 Gm.; alcohol 95 per cent., water, of each a sufficient quantity to make 1,000 c.c. Wash the tar with water until the washings are no longer acid, then dissolve in 20 c.c. of alcohol, incorporate the magnesium carbonate, and gradually add 140 c.c. of water; pour this mixture over the mixed drugs, mix well and allow to macerate for twenty-four hours in a covered container. Pack into a percolator and percolate with a menstruum of one volume of alcohol and seven volumes of water, collecting the percolate in a graduated jar containing the glycerin until the mixture measures 650 c.c., add the sugar and the chloroform, and dissolve by agitation; dissolve the codeine in 10 c.c. of water and add, and lastly add sufficient more percolate, collected by pouring a little water on the drug in the percolator, to make the finished product measure 1,000 c.c.; strain.

Saccharinum solubile. J. D. A. Hartz. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 970.) Saccharin, 500; solution of ammonia, 430. Dissolve with gentle heat, filter through cotton

wool, and evaporate to dryness on shallow plates. The product is sweeter than the sodium salt.

Ultra-violet Rays as a Means of Sterilizing Pharmaceutical Solutions. A. Lesure. (*J. Pharm. Chim.*, 1910, **1**, 569, 575.) Ultra-violet rays do not seem to be likely, at present, to prove practically useful for sterilizing pharmaceutical solutions, such as hypodermic injections. Since glass absorbs the most active sterilizing rays, those with the shortest wave-length, solutions cannot be sterilized in sealed glass vessels. They have to be subjected to the radiation, directly, in thin layers without the intervention of glass. On the large scale, possibly vacuous sterile receivers could be filled with the liquid sterilized by the rays. The only possible application might be to those salts like the glycerophosphates, which are decomposed by heating in an autoclave. Experiments show that many substances can never be sterilized by this means, on account of the large amount of decomposition which ensues. Such are solutions of quinine salts, of mercuric iodide, of atoxyl, of eserine, of apomorphine, of gentiopicrin. Opaque or strongly coloured solutions cannot be thus sterilized ; nor can suspensions of solids, such as grey oil. Then the permeability of different solutions by ultra-violet rays varies greatly, apart from the question of decomposition ; gentiopicrin solution was not sterile after half an hour's exposure, while aucubin solution was sterilized in thirty seconds. A series of prolonged exposures was made to observe the degree of decomposition. With olive oil the acid value was increased 5 per cent. in an hour. Cocaine hydrochloride solution 2 per cent. and pilocarpine hydrochloride solution 1 per cent., gave no optical indication of change with the polarimeter after three hours' exposure, but a slight development of colour indicated a minute alteration. Arbutin solution showed a slight change in a few minutes, increasing progressively up to three hours. Methyl-arbutin is markedly more resistant. It is evident, therefore, that the utilization of ultra-violet rays does not yet enter the province of practical pharmacy.

Vaseline, White and Yellow, Proposed Characters and Tests for, in the Ph.G.,V. (*Apoth. Zeit.*, 1910, **25**, 164.) The tests proposed for white and yellow vaseline, as follows, are identical, except the distinguishing colour of the original substance. The consistence must uniformly be that of a soft ointment. The melted fluorescent liquid must be odourless. No granules or

crystals should be seen under the microscope. When 20 parts of hot water are shaken up with 5 parts of vaseline, the liquid should show no red colour on adding 2 drops of phenolphthalein solution, but should show this colour on adding 0·1 c.c. of N/10 KOH solution (limit of alkali or acid). A mixture of 3 c.c. of NaOH solution and 20 c.c. of water which has been heated to boiling, with agitation, with 5 Gm. of vaseline, and is then cooled, should show no separation on adding excess of HCl (absence of saponifiable fat and resin). Equal parts of vaseline and H_2SO_4, rubbed together in a capsule, previously cleaned with H_2SO_4, should show, at the most, a brown colour, but not blackish, in half an hour (absence of organic impurity). The m.p. should be 35 to 40°C.

Vehicles, Red, White, Pineapple, and Aromatic. L. Emanuel. (*Drugg. Circ.*, 1910, **54**, 113.) *Red vehicle*: Asarum, 15 Gm.; cudbear, 1 Gm.; alcohol 95 per cent., 25 c.c.; glycerin, 50 c.c.; water, 175 c.c. Mix the asarum, in 60 powder, with the cudbear, and percolate with the mixed liquids. *White vehicle*: Compound spirit of orange, 3 c.c.; glycerin, 50 c.c.; water, 197 c.c. Mix the spirit with the glycerin, and add the water. *Pineapple vehicle*: Alcohol 95 per cent., 15 c.c.; glycerin, 25 c.c.; pineapple juice, 60 c.c.; talc, 7 Gm. Mix, allow to stand for twenty-four hours, and filter through paper. Peppermint, cinnamon and other aromatic vehicles are prepared by simply adding 1 volume of glycerin to 4 volumes of the respective aromatic water.

Virginian Prune, Syrup of. R. F. Hallaway (*Pharm. J.*, 1909, **29**, 798), and J. C. Umney (*ibid.*, 800). Hallaway gives a wide survey of the literature of the subject and detailed results of the extraction of the bark by various methods. No process extracts all the HCN originally in the bark. The B.P, process extracts about 35 per cent., Cline's about 50 per cent., and Beringer's (with glycerin) about 70 per cent. But even in the strongest syrup the HCN would just be 0·008 per cent., or, roughly, one-thirteenth of the strength of cherry laurel water, and to get a medicinal dose of HCN it would require to be given in tablespoonful doses. If medical opinion holds that the trace of acid is of no value, but that a pleasant flavouring syrup only is required, all formulae which extract an excessive amount of tannin must be rejected. This requires that no glycerin be used in the percolator, because it gives a more astringent syrup. The

B.P. process is fairly satisfactory in this respect, and easy to work. Lucas's process (*Y.B.*, **1899**, 212) gives a finer syrup, but the filtration gives trouble. Buchner's detannation plan gives a syrup quite different in appearance to what has always been understood as syrup of Virginian prune. Cline's process is the best. In this the powdered bark is macerated with water for two to four hours at a temperature of 60°C., then percolated, glycerin added to the percolate, and sugar dissolved in this. The idea is to reduce the tannin extracted, and by maceration at a higher temperature to increase the yield of HCN, the enzyme being more active at a higher temperature. If it is desired to have HCN in the syrup, the amount should be specified, and if this quantity be not formed in preparing the syrup it could be brought up to the standard by adding dilute HCN, as is done in the case of cherry laurel water.

Umney draws attention to the varying amount of tannin present in different varieties of the bark. (*a*) A comparatively thin bark, possibly the bark of the younger branches of *Prunus serotina*; (*b*) much thicker, more astringent, and much weaker in HCN. The syrup produced by the bark marked (*b*) is slightly darker in colour, and more astringent and less pleasant in taste. (See also *Y.B.*, **1905,** 285; **1906,** 156.)

With such alkaloids as codeine and heroine the astringent syrup, and indeed most of the syrups of Virginian prune on the marker, cause precipitation. They should be dispensed, therefore, with the greatest caution. The difficulty could be overcome, or to some extent obviated, by the selection of bark containing a minimum of tannin. If the bark is to continue to have official recognition, the characters should be so set out, and, if possible, tannin limitation tests included, so as to select a bark of the least possible astringency.

Wines, Detannating with Milk. W. L. Scoville. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 999.) To 6 pints 8 fl. oz. of white wine, add 5 fl. oz. of skimmed milk. Shake well and set aside for forty-eight hours. Filter off a small portion, mix with an equal volume of strychnine sulphate, 2 per cent. (or other alkaloidal solution), and set the mixture in an ice-chest for twelve to twenty-four hours. If no precipitate be then apparent, filter the bulk. If a precipitate appear, add more milk and again macerate, testing as before. For red wines, 10 oz. of milk may be necessary for the above quantity of wine. Wines thus treated

must contain not less than 18 per cent. of alcohol, by volume, after filtration. If less be present, the necessary amount must be added.

Zinc Oleate and Zinc Stearate. E. F. Cook and P. C. Dosch. (*Amer. Drugg.*, 1909, **58,** 108.) The following formulae are improvements on those previously published :—*Zinc Oleate*—Zinc sulphate, 47 Gm. ; soap (castile), dry and powdered (orgrated), 100 Gm. ; distilled water, a sufficient quantity. Dissolve the zinc sulphate in 2,500 c.c. of distilled water and filter if necessary. Dissolve the soap in 1,500 c.c. of hot distilled water, and strain the solution through cotton. Warm both solutions to about 50°C. (122°F.), and pour the solution of the zinc salt slowly into the soap solution, constantly stirring. Collect the precipitate on a muslin strainer, wash it thoroughly with distilled water, and allow it to dry on a strainer or on clean paper protected from dust and without exposure to heat. Finally pass the mass through a fine sieve. *Zinc Stearate.*—Solution of AmOH (10 per cent.), 50·2 Gm. ; stearic acid, 88·5 Gm. ; zinc sulphate, 44·8 Gm. ; distilled water, a sufficient quantity. Triturate the stearic acid with the ammonia water in a mortar to a smooth paste, adding additional ammonia water if necessary until a slight excess is present. Mix this pasty mass with 4,000 c.c. of hot distilled water and heat it until a solution results. Dissolve the zinc sulphate in 2,500 c.c. of distilled water, warm both solutions to about 50°C., and then pour the solution of the zinc salt slowly into the solution of ammonium oleate, stirring constantly. Collect the precipitate on a strainer, wash it thoroughly with distilled water, and dry it without exposure to dust or heat. Finally pass it through a fine sieve.

MISCELLANEOUS FORMULAE

Adiptine, Cavaillès's. R. Charcellay. (*L'Union pharm.*, 1910, **51,** 10.) White wax, 20 Gm. ; paraffin, 80 Gm. ; oil of sweet almonds, 400 Gm. ; wool-fat, 250 Gm. ; rose water, 150 Gm. ; cherry laurel water, 20 Gm. ; tinctures of benzoin and of vanilla, of each 4 drops.

Alba Crême Bleaching Cosmetic. (*Pharm. Zentralh.*, 1909, **50,** 1004.) Glycerin, 1,500 ; oil of sweet almonds, 1,250 ; wool-fat, 2,500 ; borax, 100 ; perhydrol, 65 ; rose water, 1,180 ;

perfume q.s. To be applied at night. If used on the hands, loose gloves should be worn after applying the cream. *Freckle and sunburn cream*: White wax, 110; oil of sweet almonds, 530; wool-fat, 1,500; borax, 150; perhydrol, 150; rose water, 700; ionone solution, 10 per cent., 5; essence of violet leaves, 4; oil of bergamot, 40; orris oil, 10. Prepare like cold cream. *Freckle and sunburn lotion*: Perhydrol, 1; rose water, 8; glycerin, 1. To be dabbed on the skin with a piece of soft linen or a pad of cotton wool.

Aleptine Vigier. R. Charcellay. (*L'Union pharm.*, 1910, **51,** 10.) Anhydrous wool-fat, 20; benzoated oil of sweet almonds, 60; spermaceti, 15; white wax, 11; sterilized distilled water, 30; balsam of Peru, 1; white gelatin, 2.

Ants, Sprinkling Powders for. (*Pharm. Zeit.*, 1910, **55,** 168.) (1) Powdered sweet flag root; powdered ammonium carbonate, of each equal parts. (2) Guano, 40; chlorinated lime, 40; black pepper, 5.

Artificial Serum, Howell's. (*Drugg. Circ.*, 1910, **54,** 224.) NaCl, 7 Gm.; $CaCl_2$, 0·26 Gm.; KCl, 0·30 Gm.; $NaHCO_3$, 0·20 Gm.; sterilized distilled water, 1,000 c.c.

Barium Sulphate, Crystalline, as a Metal Polish. P. Carles. (*Répert. Pharm.*, 1910, **22,** 195.) By precipitating very hot solutions of $BaCl_2$ with H_2SO_4, $BaSO_4$ is thrown down as a very dense minutely crystalline precipitate. These minute crystals are very hard, so that the precipitate, when washed and dried, forms an excellent polishing powder for metals. The proportions to use are: $BaCl_2$, 500 Gm.; H_2SO_4, sp. gr. 1·76, 220 Gm.; water, 20 litres. The solutions should be mixed as hot as possible, and the H_2SO_4 solution should be added in small quantities at a time, without stirring, so as to facilitate the formation of the micro-crystals. Silver, copper, and other metals, when gently rubbed with a little of the powder on a leather, instantly show a brilliant surface which is very permanent. It may be mixed with an oily base to form a paste if desired.

Books, To Preserve, in the Tropics from Insect Ravages. (*Nat. Drugg.*, 1910, **40,** 169.) Camphor, 3; phenol, 1; melt together and add to olive oil, 3. Moisten a cloth with a little of the mixture and very lightly go over the covers and edges of the books with it. If carefully done, it freshens up the covers. Not

an insect of any description will come near them. The application requires to be repeated at intervals. It has been found effective in the West Indies for keeping away cockroaches from books.

Burns, Applications for. R. Charcellay. (*L'Union pharm.*, 1910, **51**, 10.) *Lucas-Championnière's ointment*: Vaseline, 100; powdered boric acid, 10; Peruvian balsam, 1. Gastou employs storax in a similar manner. *Dupont's ointment*: The following has proved most useful in steam scalds in the mercantile marine. Oil of thyme, oil of origanum, oil of verbena, oil of geranium, of each 5; crystalline guaiacol, 20; cacao butter, white wax, of each 400; retinol (or vaseline), 1,200. *Charcellay's ointment*: Vaseline or retinol, 100 Gm.; oil of geranium, oil of verbena, oil of origanum, of each 15 drops; sodium naphtholate, 0·3 Gm. *Gastou and Guillet's Cream*: Liniment of lime, 40 Gm.; hydrous wool fat, 20 Gm.; vaseline, 10 Gm.; gomenol oil, 10 Gm.; ichthyol, 10 Gm.; orthoform, 10 Gm.; oil of verbena, 30 drops; oil of lavender, 30 drops; magnesium carbonate and talc, equal parts, sufficient to make a cream. *Healing ointment*: Peruvian balsam, 30 drops; storax ointment, 1 Gm.; oil of eucalyptus, 20 drops; liquid paraffin, 25 Gm.; precipitated chalk, 12 Gm. This is to be used after the previous ointment has been applied for about fifteen days.

Burns in the Mouth, Applications for. (*Formulary of Nouveaux Remèdes*, 1909, **18**, 2.) *Gargle*: Linseed, 5 Gm.; marshmallow root, 5 Gm.; crushed poppy head, 1; boil in water, 250 c.c. *Mouth wash*: Chloral hydrate, 2·5; syrup of poppies, 20; distilled water, 200. Use every two hours. *Application*: Chloral hydrate, 1; borax, 2; glycerin, 60. *Liniment*: Sydenham's laudanum, 1; salol, 1; lime water, 6; olive oil, 6.

Camphor, Cream of. (*Drugg. Circ.*, 1910, **54**, 114.) Castile soap, 120 grains; ammonium carbonate, 120 grains; powdered camphor, 120 grains; oil of thyme, 1 drachm; oil of turpentine, 2 fl. oz.; tincture of opium, 2 drachms; water enough to make 16 fl. oz. Dissolve the soap and the ammonium carbonate in 10 fl. oz. of water and pour the solution into a 16 oz. bottle. Dissolve the camphor in the mixed oils, and add this to the soap solution, shaking the bottle vigorously, until an emulsion is formed. Finally add the tincture of opium and

enough water to bring the measure of the whole up to 16 fl. oz.

Comby's Rheumatism Ointment. (*Bull. gen. de Therapeut.*, 1910, 1, 112.) Cocaine hydrochloride, 1; extract of belladonna, 4; vaseline, 20; lanoline, 20. Mix.

Cucumber Toilet Preparations. (*Drugg. Circ.*, 1910, **54**, 241.) *Cucumber Essence*: (1) Press the juice from cucumbers, mix with an equal volume of alcohol 90 per cent., and distil. If the distillate is not sufficiently perfumed, more juice may be added and the mixture again distilled. (2) Peel the cucumbers before expressing their juice; take as much alcohol as there is cucumber juice, add half of it to the juice and in the other half macerate the peelings for three days. Mix the two liquids and filter. *Cucumber Cream*: (1) White wax, 3 oz.; spermaceti, 3 oz.; benzoated lard, 8 oz.; cucumbers, 3 oz. Melt together the wax, spermaceti and lard, and infuse the cucumbers, previously grated, in the liquid. Allow the mixture to cool, stirring well; let it stand a day, re-melt, strain and again stir until cold. (2) Small cucumbers, 2 only; olive oil, 4 oz.; hydrous wool-fat, 2 oz.; white wax, 1 drachm; spermaceti, 1 drachm. Slice the entire cucumbers and steep them in the oil, which should first be boiled. Set the mixture aside for 24 hours, and then strain it. Incorporate the wool-fat and wax by the aid of heat, and beat the whole into a light cream. (3) Cucumber juice, 10 oz.; white wax, 9 oz.; liquid paraffin, 24 oz.; benzoic acid, 15 grains; distilled water, 8 oz.; borax, 90 grains; oil of rose, 15 drops. Grate fresh cucumbers and express from them 10 oz. of juice. Allow this to stand for a while, and then strain it through fine muslin. Add the water and borax. Dissolve the wax in the oil by the aid of heat, and add the benzoic acid. When partially cool, add the warmed juice solution and the oil of rose, and pour into jars. (4) Expressed oil of almonds, 4 drachms; powdered acacia, 100 grains; water, 4 drachms; rose water, 8 oz.; Cologne water, 1 drachm; spirit of camphor, 1 drachm; cucumber juice, 4 drachms; tincture of benzoin, 30 drops. Emulsify the oil with the water and acacia, and add the other ingredients. *Milk of Cucumbers*: (1) This formula is attributed to A. E. Ebert: Cucumber juice, 8 oz.; oil of sweet almond, 2 oz.; spirit of soap (N.F.), 2 oz.; tincture of benzoin, 1 drachm; oil of bitter almonds, 1 drop; oil of lavender, 15 drops; oil of bergamot, 10 drops. To make the cucumber juice pour boiling

water over sliced, but not peeled, green cucumbers. When the slices have become soft and pulpy, remove them from the water and squeeze them in a muslin bag. To each 7 oz. of juice add 1 oz. of alcohol. (2) Sweet almonds, 80; fresh cucumber juice, previously boiled, 200; castile soap, 5; cucumber essence, 60; simple tincture of benzoin, 1. [No directions are given. Presumably the almonds should be blanched and rubbed down, to form almond emulsion, with the cucumber juice, in the usual manner. The soap should be dissolved, with gentle heat, in the essence; the two liquids should then be mixed, and the tincture added. The emulsion should then be strained through fine muslin. ED. *Y.B.*] *Glycerin of Cucumber*: Yolk of 1 egg; glycerin, 2 fl. oz.; tincture of quillaia, 2 drachms; oil of sweet almonds, 1 oz.; essence of cucumber, 1 oz.; rose water, to make 8 fl. oz. Mix the egg yolk with the glycerin and add the tincture of quillaia; gradually beat in the essence diluted with 2 oz. of rose water. Finally adjust to 8 fl. oz. with more rose water. Cucumbers sliced, 5 oz.; wine vinegar, 96 fl. oz. Macerate for 3 weeks, strain and filter. *Cucumber lotion*: Fresh cucumber juice, 16 fl. oz.; benzoic acid, 30 grains; boric acid, 60 grains; glycerin, 2 oz. Perfume if required; but the lotion is better without any added perfume. (See also *Y.B.*, **1908**, 275.)

Depilatory Paste, Non-irritant. J. Lutje. (*Pharm. Zeit.*, 1909, **54**, 989.) Strontium sulphide, 3; starch powder, 4; water, 16, are rubbed down together, and the mixture is heated to boiling until a smooth paste results. When cold this forms a non-irritant but effective depilatory cream. It is stated that by thus boiling with starch the other sulphides, such as those of barium, calcium and even those of the alkalies lose their irritant action on the skin.

Disinfectant Fumigant for the Sick-room. (*Medical Press*, 1910, **89**, 118.) Wood creosote, 3 parts; essential oil of eucalyptus, 1 part; benzoic acid, 1 part; proof spirit, 48 parts, mixed, forms a valuable preparation for disinfecting the sick room. An iron tablespoon is filled with the liquid, ignited with a match, and allowed to burn itself out. If this is done in the evening, when the room is definitely closed for the night, the inhalation of the vapour has most beneficial results in cases of phthisis, chronic bronchitis, whooping cough, and other lung or throat affections.

Glycerin and Honey Jelly for the Skin. E. Richter.

(*Apoth. Zeit.*, **24**, 327.) Gelatin, 15, is soaked in water, 180, for two hours; glycerin, 600, is then added, and the gelatin is dissolved on the water-bath. A solution of honey, 50, in warm water, 100, is then stirred in; the mixture is strained and perfumed with essence of lily of the valley, 10. The product is said to resemble "Kaloderma." It should be filled while warm into collapsible tubes.

Hair Washes. T. Robinson. (*Practitioner*, **83**, 568.) For *dry scalp* with loss of hair the following lotion may be prescribed:—Olive oil, ʒiv; solution of ammonia, ʒiv; spirit of nutmeg, ʒiv; rectified spirit to make ℥iv. To be dispensed in a sprinkler bottle, and to be used frequently. In cases where the scalp is *moist or greasy* the following is preferable: Tincture of aconite, ʒi; strong solution of ammonia, ʒiv; tincture of capsicum, ʒij; oil of rosemary, ʒi; compound camphor liniment to ℥iv. To be rubbed into the scalp with a piece of flannel. Where loss of hair accompanies *irritation of the scalp* a sedative application is called for, such as the following: Glycerin, ʒij; borax, ʒij; cherry laurel water, ʒij; distilled water, to make ℥viii. In most cases of hair trouble, and specially in seborrhoea, a thorough and frequent shampoo is useful. For this purpose the following shampoo liquid is recommended: Lavender oil, ℥xx; soft soap, ℥iij; rectified spirit, ℥ij; water to make zvi. One tablespoonful to be used for each shampoo. After this, the following ointment may be applied by parting the dried hair two inches apart, and rubbing the following ointment into the partings thus made. Precipitated sulphur, ʒiij.; salicylic acid, ʒi; lavender oil, ♏xx; lanoline, ℥i; soft paraffin, ℥ij.

Herpes, Dusting Powder for. (*Formulary of Nouveaux Remèdes*, 1910, **27** [8].) Apply vaseline to the parts, then dust with a mixture of zinc oxide, 1; calomel, 1; bismuth subnitrate, 3.

Labelling Paste. (*Drugg. Circ.*, 1910, **54**, 244.) Gelatin, 4 oz.; water, 32 oz.; flour paste, 32 oz.; solution of sodium silicate, 1 oz.; oil of cloves, ¼ oz.

Soak the gelatin in 16 fl. oz. of water until softened, then dissolve with the aid of a gentle heat. While hot pour in the paste diluted with the rest of the water, and stir in the solution of silicate, while the mixture cools, using a wooden paddle. When cold, beat in the oil.

Mouth Wash, Disinfectant, to Preserve the Teeth from Decay. (*Bull. gen. de Therap.*, 1910, **158,** 592.) Salol, 4 to 10; oil of peppermint, 2; oil of cloves, oil of cassia, oil of star anise, of each 1; alcohol 90 per cent., to make 400. A teaspoonful in a glassful of water to be used to rinse the mouth.

Nasal Disinfectant Inhalation. —Vincent. (*L'Union pharm.*, 1910, **51,** 157.) Iodine, 12; potassium iodide, 6; guaiacol, 2; thymol, 0·25; alcohol 60 per cent., 200. Dissolve. A little is placed in a small capsule and floated on very hot water. The vapour is then inhaled through each nostril.

Ointment for Juvenile Acne, Gaucher's. (*Med. Press.*, 1910, **89,** 590.) Salicylic acid, 1; sulphur (precipitated), 1; powdered camphor, 1; pure cade oil, 6; oxide of zinc, 12; vaseline, 24. The face should be washed, night and morning, with very hot water, containing a teaspoonful of borax. The above ointment should then be applied at night.

Potassium Chlorate Tooth Paste. E. Richter. (*Apoth. Zeit.*, 1909, **24,** 859.) $KClO_3$, in powder, 1,200; powdered hard soap, 400; precipitated chalk, 800; glycerin, 1,200; distilled water, 360; peppermint oil, 32; clove oil, 7. The powdered soap and $KClO_3$ are sifted together; the oils are rubbed down with a little of the $CaCO_3$, and mixed with the rest. The powders are mixed and massed with the glycerin and water. The paste should be filled in to collapsible tubes.

Powder for Bed Sores. (*Med. Press.*, 1910, **89,** 445.) Dermatol, 4; stovaine, 1; powdered benzoin, 2; starch powder, 10.

Quassia Plant Spray. (*Drugg. Circ.*, 1910, **54,** 229.) The following non-poisonous spray is recommended for killing parasites on vegetables and ornamental plants: Extract of quassia, 3; camphorated oil, 2; soft soap, 10; alcohol, 5; water, enough to make 100.

Raspberry Syrup. J. D. A. Hartz. (*Proc. Amer. Pharm. Assoc.*, 1909, **57,** 967.) The following formula is an improvement on that at present in the N.F. Fresh ripe raspberries, a convenient quantity; coarse granulated sugar, q.s.; solution of Russian isinglass, q.s. Crush the raspberries and allow to ferment for 4 days at about 70°F. Express the juice and add to each gallon 1½ fluid drachms of isinglass solution. Filter. To every

10 parts of clear juice add 18 parts of sugar; boil, and strain through flannel. Bottle when cold.

Solid Opodeldoc. —Dunning. (*Nat. Drugg.*, **39**, 395.) Monohydrated sodium carbonate, 5; stearic acid, 25; water, 50; alcohol 90 per cent., 500; camphor, 12·5; oil of thyme, 1·5; oil of rosemary, 3; strong solution of ammonia, 25 Dissolve the sodium carbonate in the water with the aid of heat; add 10 parts of alcohol and the stearic acid. Warm until effervescence ceases and perfect solution is effected. Then add the remainder of the alcohol, the oils and the solution of ammonia. Filter into bottles, stopper tightly, and set aside to cool.

Tar Bath. K. Taege. (*J. Pharm. Chim.*, 1909, **30**, 96.) The following is a simple method for preparing tar baths, prescribed in certain skin diseases: Wood tar, 150 Gm.; KOH solution, sp. gr. 1·14, 90 Gm. Mix well, and add methylated spirit, 500 c.c. Pour half this mixture in a thin stream into the bath water, constantly stirring. The bath thus prepared is neutral, free from unpleasant odour, of a uniform greyish colour, and does not leave particles of tar on the patient's body, nor on the sides of the bath even if allowed to stand for several days. The important point is to add the tar solution very gradually to the water, and to agitate thoroughly while this is being done.

Toothache Drops. (*Merck's Report*, 1909, **22**, 103.) Acetone chloroform, 2; camphor, 2; tincture of cinnamon, 0·5; oil of cajuput, 5.

Tooth Paste, Saponaceous, for Syphilitics. —Queyrat. (*L'Union pharm.*, 1910, **51**, 208.) Powdered almond oil soap, 40; glycerin, 25; extract of rhatany, borax, of each 1·4; oil of aniseed, 1·5; oil of peppermint, 0·5. Mix. Use with a soft tooth brush.

RESEARCH LIST, 1910

THE following subjects are suggested for investigation, and the Executive Committee hopes that the members of the B.P.C. will undertake to work on one or more of these questions. It will be noted that several subjects have already been appropriated. In order to avoid duplication the Honorary Secretaries trust that members will communicate to them their intention of working at any of the above subjects; they also wish to direct attention to the fact that a special fund exists to defray expenses connected with research work. The Executive Committee will be glad to receive applications from members for grants from this fund.

1. *Aloin.*—A research is needed on the proportion of aloin and non-resinous constituents in the different varieties of aloes.

2. *Calabar Bean.*—A research is needed with the object of ascertaining the relative proportion of the different bases present in this drug.

3. *Colchicum.*—A comparison of the published processes for the assay of colchicum and its preparations. (Already undertaken.)

4. *Cold Storage.*—The value of cold storage for drugs, herbs, and medicinal plants requires investigation.

5. *Gelsemium Root.*—Required, an investigation into the relative proportion of gelsemine and gelseminine.

6. *Hops.*—How can the bitter principle best be isolated and quantitatively determined ?

7. *Male Fern.*—The chemistry and pharmacy of this drug both require investigation.

8. *Podophyllum emodi* is official in the B.P. Addendum as a source of resin for use in India and the Colonies. Should it not also be included in the next edition of the ordinary British Pharmacopœia ? (Already undertaken.)

9. Rubber when frozen becomes hard and brittle. Could advantage be taken of this property of bodies for powdering drugs which readily undergo change on drying by heat ?

10. *Strophanthus.*—An examination of the published methods of separating the different active principles obtained from the seeds is needed with a view of recommending a standard process. (See *Year-Book*, **1898**, 54, 162; **1899**, 59; **1901**, 167; also *Pharm. Journal* [4], **6**, 385, 506.) The seeds in commerce are frequently mixed. Further information is desirable as to the active principles they severally contain.

11. *Tannin.*—A ready and tolerably accurate method for the determination of the tannin in various astringent drugs is required.

12. *Veratrine.*—Should a pure veratrine be included in the British Pharmacopœia rather than the mixture of alkaloids now official? If so, suggest a process for its purification.

13. *Zinc.*—To what extent is zinc found in the ash of drugs?

14. *Chemical investigation* of the following drugs is required:—*Cereus grandiflorus, Cassia fistula, Serenoa serrulata* (saw palmetto), *Arnica montana, Monsonia ovata, Monsonia biflora, Thuja occidentalis, Ranunculus ficaria, Tanacetum vulgare*, etc.; *Senecio Jacoboea* and *Achillea millefolium.*

15. The *Chemistry* of the following drugs requires extension:—*Aletris farinosa, Cascara Sagrada, Colocynth, Damiana, Ergot, Lobelia, Rhubarb, Senega, Senna.*

16. *Apomorphine.*—Do solutions of salts of this alkaloid retain their potency after colôuration has taken place?

17. *Calx sulphurata.*—An investigation on the processes of manufacture, and purity of commercial samples is needed. (Already undertaken.)

18. *Chart.*—An analytical chart for the detection of the synthetic remedies would be useful.

19. *Diabetic Foods.*—Commercial diabetic foods require examination.

20. *Esters.*—Examination of commercial esters such as ethyl acetate, ethyl butyrate, and amyl acetate would be useful.

21. *Indicators.*—Can some of the artificial colours which are only affected by mineral acids be used to determine the strength of preparations such as Liquor plumbi subacetatis?

22. *Solvents.*—Experiments are needed with a view to extending the use of solvents such as acetone, carbon tetrachloride, petroleum ether, etc., in pharmacy.

23. *Uric Acid.*—A comparison of the processes for the estimation of uric acid would be useful.

24. *Camphor.*—Processes are required for the estimation of

the camphor in some of the official preparations. (Already undertaken.)

25. *Cannabis indica.*—Required standard strengths for the official preparations of this drug and processes for their determination, also the difference in yield of resin, cannabin, and cannabinol between the Guaza of Bombay, the Ganja of Calcutta, and other commercial varieties of cannabis. African Guaza is now coming into the market—a comparison of its properties with those of Cannabis indica would be of value.

26. *Colocynth.*—What is the effect of heat on the colocynth in making the compound extract ?

27. *Ergot.*—A re-investigation of the pharmacy of this drug in the light of recent chemical work is required, and a method of determining the activity of the galenical preparations.

28. *Ferments.*—The action of ferments in inducing change in galenical preparations should be studied.

29. *Formaldehyde.*—The examination of commercial samples is required.

30. *Formulae.*—Improved formulae are required for the administration of nauseous drugs.

31. *Gum Resins.*—The value of the saponification numbers in determining the identity and purity of the resin of gum resins.

32. *Japanese Chillies* and *Japanese Ginger.*—Determination of the botanical source and comparison of the structure with that of the official drug is required. (Already undertaken.)

33. *Morphine.*—Can the process described in the *Year-Book of Pharmacy*, **1907**, p. 107, for the determination of morphine be applied to opium and its preparations ?

34. *Oil of Soya Bean* has become an important article of commerce. Can it be utilized in pharmacy ?

35. *Ointments.*—The melting-point of the official ointments is required.

36. *Pills.*—A systematic investigation is required of the times necessary for the solution or disintegration of pills prepared with different excipients and kept for various periods of time.

37. *Quillaia Bark.*—Experiments to determine the best solvent for exhausting this bark for the purpose of making emulsifying agents, and a comparison of the genuine bark with the thin bark at present in commerce.

38. *Concentrated Tinctures.*—An examination of commercial samples is required.

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

FORTY-SEVENTH ANNUAL MEETING

IN

CAMBRIDGE.

1910

CONTENTS.

PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-SEVENTH ANNUAL MEETING, CAMBRIDGE, 1910.

OFFICERS.

President. FRANCIS RANSOM, F.C.S., Hitchin.

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(Who have filled the office of President.)

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BARKER, MRS.
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CAMPKIN, MRS.
DECK, MISS.
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LEECH, MRS.
PECK, MRS.
MALLETT, MRS.
MOSS, MRS.
STURTON, MRS.

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE

BOTANY SCHOOL, CAMBRIDGE,

ON TUESDAY, WEDNESDAY AND THURSDAY, JULY 26, 27 AND 28, 1910.

TUESDAY, JULY 26.

The CONFERENCE met at 9.30 a.m., adjourning at 1.30 p.m.

Order of Business.

Address of Welcome.
Presidential Address.
Financial Statement.
Report of Executive Committee.
Reading of Science Papers and Discussions thereon.

PAPERS.

1. *The Bacteriological Standardization of Disinfectants*, by Prof. G. Sims Woodhead and Dr. Constant Ponder.
2. *The Bacteriological Testings of Disinfectants*, by C. T. Kingzett, F.I.C., F.C.S., and R. C. Woodcock, F.I.C., F.C.S.
3. *Note upon the Woodhead-Ponder Modification of the Rideal-Walker Method of Testing Disinfectants*, by Prof. R. T. Hewlett.
4. *The Limitations of Water Analyses Reports, both Bacterial and Chemical*, by J. E. Purvis, M.A.
5. *The Old English Herbals in the Cambridge Botany Library*, by J. Reynolds Green, D.Sc., F.R.S.

WEDNESDAY, JULY 27.

The CONFERENCE met at 9.30 a.m., adjourning at 1.30 p.m.

Order of Business.

Reception of Delegates.

PAPERS.

6 *Note on Turmeric*, by F. H. Alcock, F.I.C.
7. *The Effect of Age on the Composition of Oil of Anise*, by Arthur W. Knapp, B.Sc., F.I.C.
8. *Oil of Cinnamon Bark*, by J. C. Umney and C. T. Bennett.
9. *The Proposed Essential Oil Monographs*, by John Henderson.
10. *Note on Periodicity of Properties of the Elements—New Arrangement*, by J. F. Tocher, B.Sc., F.I.C.
11. *Nature Reserves*, by G. C. Druce, M.A., F.L.S.
12. *Exhibit relating to John Ray; with a Brief Sketch of his Life and Work.* By G. C. Druce, M.A., F.L.S.
13. *Phosphoric Acid and Ammonium Phosphate*, by T. E. Wallis, B.Sc.
14. *An Insect Pest in Belladonna*, by P. É. F. Perrédès, B.Sc.
•15. *Asafetida*, by J. C. Umney and S. W. Bunker.

16. *Liquid Extract of Ergot: An Improved Method of Preparation*, by J. H. FRANKLIN. *Results of Physiological Tests*, by G. S. HAYNES, M.D.
17. *Chemical Examination of Cimicifuga Racemosa*, by HORACE FINNEMORE, B.Sc.

THURSDAY, JULY 28.

Order of Business.

PAPERS.

18. *A Note on the Flowers of Bassia Latifolia*, by REGINALD R. BENNETT, B.Sc., A.I.C., Ph.C., and J. D. ANKLESARIA, Ph.C.
19. *The Extemporaneous Preparation of Chloroformum Belladonnae*, by ERNEST QUANT, F.C.S.
20. *Note upon the Filling of Hypodermic Ampoules*, by THOMAS STEPHENSON.
21. *Samuel Corbyn's Catalogue of Cambridge Plants*, by G. C. DRUCE, M.A., F.L.S.

GENERAL BUSINESS.

1. Presentation to the Cambridge Pharmaceutical Association of Books from the Bell and Hills' Fund.
2. Presentation to Mr. EDMUND WHITE, B.Sc., F.I.C., late Honorary General Secretary.
3. To arrange place of Meeting for 1911.
4. To discuss the motion to be moved by Mr. J. C. UMNEY—"That Art I. Object 4, shall read, after the word 'established,' 'for the advancement of the Science and Practice of Pharmacy.'"
5. To decide whether the British Pharmaceutical Conference shall appoint ten representatives to form with ten representatives of the British Medical Association a Joint Standing Committee to promote the realization of aims found to be common to both bodies.
6. To elect Officers for 1910–1911.
7. To move a vote of thanks to the University and College authorities for granting the use of various Halls, etc.
8. To move a vote of thanks to Sir T. Clifford Allbutt and the members of the Medical Profession for their Reception on the Thursday evening.
9. To move a vote of thanks to the Local Entertainment Committee.
10. To move a vote of thanks to the President.

BRITISH PHARMACEUTICAL CONFERENCE.

LIST OF VISITORS, ANNUAL MEETING, CAMBRIDGE. 1910.

Aberdeen—Giles, W.; Hay, W. F.

Barnet (New)—Young, R. F.

Bath—Isaacs, Mrs.

Beckenham—Parsons, W.

Bedford, Cape Colony—Cooper, J. A.

Bedlington—Foggan, Geo., and Mrs. Foggan.

Belfast—Nicholl, J. W.

Birmingham—Alcock, F. H., and Mrs. Alcock.

Blandford—Groves, R. H.

Bolton—Blain, W. R., and Mrs. Blain; Knott, P., and Mrs. Knott.

Cambridge.—Barker, S. F., and Mrs. Barker; Beall, G. E.; Bruce, A. B.; Campkin, A. S., and Mrs. Campkin; Church, E. H.; Cook, H. F., and Mrs. Cook; Cunningham, Geo.; Deck, A.; Delph, G. C.; Evans, John, and Mrs. Evans; Flanders, H., and Mrs. Flanders; Green, Dr. J. R.; Jennings, A. R.; Lynch, R. I.; Mallett, T. J., and Mrs. Mallett; Missen, F. J.; Peck, E. Saville, and Mrs. Peck; Ponder, Dr. Constant; Purvis, J. E.; Rideal, E. K.; Knights, J. West; Wood —; Woodhead, Prof. G. Sims.

Castle Cary—Moore, F. S.

Cheltenham—Thomas, J. Arden, and Mrs. Thomas.

Coldstream—Elliot, W. M.

Cottenham—Holdgate, A.

Croydon—Ashton, F. W.; Brown, G.

Derby—Taylor, S., and Mrs. Taylor.

Dublin—Smith, J.; Wells, W. F., and Miss Maude Wells.

Dundee—Kerr, Chas.

Eastbourne—Senior, J., and Mrs. Senior.

Edinburgh—Bayne, Thos.; Cowie, W. B.; Dey, A. J.; Duncan, W.; Hill, J. Rutherford; Stephenson, T.

Enfield—Goldby, F.

Exeter—Gadd, H. W.

Forfar—Macfarlane, M.

Galashiels—Henry, J., and Mrs. Henry.

Gravesend—Clarke, R. Feaver.

Haddington—Wilson, W. P.

Hanley—Jones, Edmund.

Hitchin—Henderson, H. J.; Latchmore, A.; Pack, F. J.; Perrédès, P. E. F.; Ransom, F., and Mrs. Ransom; Ransom, —, junr.

Hove—Cripps, R. A.

Kingston-on-Thames—Shears, J. C.

Leeds—Branson, F. W.

Leicester—Burford, S. F.

Lilydale, Victoria—Beresford, F. H., and Mrs. Beresford.

Liverpool—Abraham, T. F.; Evans, Sir Edward; Gibson, R. S. Harvey; Marsden, Prosper H., and Mrs. Marsden; Morgan, H. B.; Saunders, W. H., and Mrs. Saunders.

London—Allen, K. C.; Bennett, R. R.; Bourdas, T., and Miss Bourdas; Bremridge, R.; Brewis, E. T.; Buchanan, Miss M. E.; Campion, S. H.; Cresswell, E.; Crossley-Holland, F. W.; Daniels, M. E.; Dixon, C. H.; Feilmann, E.; Finnemore, H., and Mrs. Finnemore; Greenish, Prof. H. G.; Hall, S. Godfrey; Harrington, J. F.; Harrison, E. F., and Mrs. Harrison; Hearn, John; Hennings, C. R.; Hewlett, Prof. R. T.; Howie, W. L., and Mrs. Howie; Humphrey, John; Idris, T. H. W.; Kingzett, C. T.; Lescher, T. E.; Mackenzie, Donald; Martindale, Dr. W. H.; McGuffie, W. A.; Naylor, W. A. H.; Rideal, Dr. S.; Robinson, R. A.; Somerville, D., Tyrer, T., and Mrs. Tyrer; Umney, J. C., and Mrs. Umney; Want, W. P.; Whigham, R. L.; White, Edmund, and Mrs. White; Widdowson, T. S.; Woodcock, R. C.; Woolcock, W. J. U.; Woolley, S. W.

Manchester—Balmforth, A.; Cleworth, J.; Franklin, J. H., and Mrs. Franklin; Hughes, W. Griffiths, and Miss A. C. Hughes; Johnstone, C. A., and Miss Johnstone; Kirkby, W., and Mrs. Kirkby; Little, Miss; Pidd, A. J., and Miss M. E. Pidd; Wild, John.

Melbourne, Victoria—Forrest, J. K.

Melton Mowbray—Attenborough, J.

Newcastle-on-Tyne—Clague, T. M., and Mrs. Clague; Martin, N. H.; Russell, C. J., and Mrs. Russell.

New York—Gregory, Russell S.

Norwich—Sutton, F.; Watson, J. E. M., and Mrs. Watson.

Oldham—Bagshaw, H., and Mrs. and Miss Bagshaw.

Oxford—Clayton, C.; Clayton, C. B.; Druce, G. C.; Leach, T. H. le Blois.

Peterborough—Hall, J.

Peterhead—Tocher, J. F.

Plymouth—Woods, W. H.

Shrewsbury—Cross, W. G., and Mrs. Cross.

Southport—Cave, J. R.; Righton, J.

Southsea—Barlow, T. O.; Bell, W. A.; White, T. A., and Mrs. White.

Staines—Sharvill, F.

Sudbury—Deane, Harold, and Mrs. Deane.

Torquay—Bourne, H. F.; Quant, E., and Mrs. Quant.

Tunbridge Wells—Hobbs, A. E.; Wallis, T. E., and Mrs. Wallis.

Tynemouth—Bell, W. J.

Weybridge—Neathercoat, E. T.

Willingham—Turner, W. S.

Wolverhampton—Gibson, F. J., and Mrs. Gibson.

Wrexham—Barker, A. W.

Also without address—Fisher, R.; Moore, Miss F.; Ormerod, Miss.

GENERAL MEETING

Tuesday, July 26

The Sessions of Conference opened in the Lecture Theatre of the Botany School at 9.30 on Tuesday, July 26, the PRESIDENT (Mr. Francis Ransom, F.C.S.) in the chair, and he was supported by Dr. A. W. Ward, Master of Peterhouse, Deputy Vice-Chancellor of the University; Alderman W. P. Spalding, Mayor of Cambridge; Mr. J. F. Harrington, President of the Pharmaceutical Society, Mr. John Smith, President of the Pharmaceutical Society of Ireland; Alderman A. S. Campkin, Professor Seward, Messrs. N. H. Martin, G. C. Druce, J. F. Tocher, W. Giles, Thomas Tyrer, R. A. Robinson, T. H. W. Idris, John C. Umney, Edmund White, W. A. H. Naylor, and E. Saville Peck and Horace Finnemore (Joint Hon. General Secretaries).

The MASTER OF PETERHOUSE, in welcoming the Conference to Cambridge, said the task devolved upon him in the absence of the Vice-Chancellor, who regretted extremely that his engagements at Canterbury prevented him from being there that day. Had he been able to perform this task, it would have been one of the last occasions on which he performed a public duty in that University, and he (the speaker) might say, in the presence of many members of the University, that no series of duties could have been performed with greater readiness or with more charm and dignity (hear, hear). But the Vice-Chancellor was unable to be present, and he (Dr. Ward) very inadequately represented him. He had no personal claims to address them, neither had he any particular claim to address them in connexion with the college to which he belonged. In the circular that had been sent out Peterhouse College had been correctly described as the oldest of the Cambridge Colleges, but they did not owe their extremely long life to any special connexion with the medical profession (laughter). They had some distinguished members of that profession on their roll. They had now no doubt whatever that they had admitted as a fellow-Commoner to their high table the discoverer of the circulation of the blood, and another member of the College was Sir Thos. Brown, one of the wittiest and most humorous of men, who occupied the dis-

tinguished post of President of the College of Physicians. A third medical man of eminence whom he could recall as having belonged to their College belonged to an earlier date. He was so able a man that the critics would not allow him the credit of the book which he wrote, hence Pope's famous line, "Garth did not write his own Dispensatory." The Vice-Chancellor, had he been present, would have said, as he (the speaker) said, that they in that University recognized the importance of the meeting, and welcomed it with great pleasure. He understood that the Conference numbered something like 1,000 members, a large number even in these days of large conferences and assemblies, and it consisted of most important members and factors. It included teachers and examiners in a branch of medical research and practice of which the importance was certainly not underrated in the present day, especially after the recent action taken by the General Medical Council, and which extended into ranges of medical inquiry which could not have been dreamt of when the Association was founded. For instance, he noticed how many papers were to be read in connexion with bacteriological research, a branch now taken as connected with the researches of pharmacy. The Conference also included those who were chemists in the great works and whose services were of such acknowledged public utility. The conference consisted, lastly, of the practitioners to whom they owed so much in their daily lives. The Conference had already met at Oxford, where they were received by the then Chancellor, Professor Edward Caird, and Professor Sir Henry Acland. They would see that they were to receive an address from the Regius Professor of Medicine, of whom they were all proud. They would find there a very great development in recent years in their large and flourishing medical school, a development in which the University, aided by the benefactions, had striven to keep abreast of the times in the appliances for medical study, and they would see what a botanical laboratory they now possessed; and he hoped they would be able to pay a visit to the botanical garden, one of the best-managed institutions in connexion with the University. That Conference typified the connexion between scientific research and the national needs, but there was another connexion which had been brought to his mind by observing that one of the papers to be read related to John Ray, who exemplified the connexion between letters and science, which was one of the features of that University—(hear, hear)—and a

feature on which they all set the greatest value. He was a man almost as distinguished in the literary presentment of his work as in the work itself. In further remarks Dr. Ward asked his hearers to believe that while their welcome was most warm, their recognition of the importance of the work in which the Conference was interested was most serious and thorough. The University recognized the serious importance of their work, and welcomed them as representing the effort to carry that work further. The Univerity took the greatest pleasure in seeing that Conference in its midst.

The MAYOR OF CAMBRIDGE said he esteemed it a great privilege to be allowed to welcome the Conference on behalf of the ancient Borough of Cambridge. They did not bow even to the University in the cordiality of their welcome. It seemed to him that this Conference meant something more than the ordinary conferences which were held up and down the country, which were generally, he supposed, in the nature of trade protection societies. It was aiming at something far higher than the mere protection of trade interests. Their programme showed that they were determined at the Conference to give attention to studies of vast importance, not only to their profession and to the medical profession, but to the community at large. The questions before them were vital to the health of the community, and as such he supposed that it was only fair for him to say that their objects and interests were second only to those of the medical profession itself. Theirs was an ancient, an interesting, and a learned profession, and one to which the community as a whole were deeply indebted.

Professor SEWARD remarked that he had the pleasure of being tenant of the building where the Conference was held, and it was a great privilege to him to be able, through the University, to place that room at the disposal of the Conference. In being tenant of that building he was almost content. The building, as they might be aware, was of comparatively recent date, and was opened by his late Majesty King Edward VII. He thought they would agree that it was one of the very best scientific buildings in Cambridge. He thought they would agree that there was a considerable connexion between botany and pharmacy. Some years ago he had the honour to be Examiner to the Pharmaceutical Society, and was then able to appreciate the high standard of efficiency maintained in connexion with the examinations.

Alderman CAMPKIN said that after the eloquent addresses to which they had listened, any remarks from him might be regarded as superfluous; but it was his pleasure as well as his privilege to accord them, on behalf of the Local Committee, a very hearty welcome to their town. The eloquent address of the Right Worshipful the Vice-Chancellor had so fully explained the objects and the aims of this Conference that it was unnecessary for him to say more upon these except that he believed one of the objects of the Conference, as had been referred to by His Worship the Mayor, was to separate the commercial from the professional aspect of their calling. The Conference itself, numbering some thousand members, was not, as many of them knew, the Pharmaceutical Society, which numbered over 7,000 members. The Society dealt with the professional aspects, to a large extent, and was responsible for the education and examination, as well as the registration, of the candidates for their profession. The Conference, on the other hand, acted in a supplementary capacity to the Society, and was formed for the purposes of research, friendly union and advancement in the practice of Pharmacy. He must not say more on that phase, but in offering them a welcome to the town he would remind them that they had been offered a very hearty welcome to the University—with its magnificent buildings, many of them rich in ancient traditions. The colleges, halls, chapels, libraries, as well as the beautiful gardens, were open to them. The town and the University would receive them to the best of their ability, and they trusted that the arrangements they, as members of the Local Committee, had made would be to their entire satisfaction. When it was suggested, and when finally decided, to invite the Conference there, he assured them that the members of that Committee experienced no small amount of fear and trembling, for they felt that they could not emulate the generous hospitality extended by the Local Committees of towns visited in former years—notably those in the North and in the great centres of population. But they were informed that the desire of the Conference was to come to Cambridge because of its associations and its connexion with the world at large. It was his privilege years ago to attend the Oxford Conference, to which allusion had been made. That was a great success, and gave the utmost satisfaction. With regard to their county, he might say that they had made arrangements to show them something of the district outside, although they were told that they need not have done so, in so far that the

visit to Cambridge would occupy the whole time that was left at the disposal of the delegates after attending the various lectures and discussions. A transatlantic writer some fifty years ago, who was a graduate of this University, returning home after his residence here, described the surroundings of Cambridge as dull and uninteresting even to ugliness, consisting largely of fen, waste, and marsh land, the last on the chalk and the first on the fen. Possibly this was partially true at that time, but certainly it was not so to-day. They would find in the course of their investigations that great attention had been paid to the surroundings of the county by agriculturists and others. Thousands of acres of fen land had been reclaimed, beautified and rendered most productive. In place of fen land they had now hundreds of acres of orchards and gardens, from which large consignments of produce were sent to all parts of the country. The only thing they had been unable to do had been to control the elements. They hoped, however, that even these might soon be in their favour. After spending a few days there they trusted that they would find that the visit to Cambridge had been among the pleasantest they had experienced. In the name of the Local Committee he offered them a hearty welcome.

The PRESIDENT OF THE PHARMACEUTICAL SOCIETY (Mr. J. F. HARRINGTON) moved a vote of thanks to the Deputy Vice-Chancellor and the Mayor for the kind words of welcome which they had uttered, and for their appreciation of the work the Conference was trying to do. The Conference was anxious to come to Cambridge, because it was an educational centre which was known all over the civilized world. Some years ago they remembered visiting Manchester University, and there they saw the work which the pharmaceutical section had taken in hand. At that time Dr. Ward was Principal, and they had an opportunity of seeing the excellent work Dr. Ward had done for that seat of learning. In Cambridge, while carrying on so splendid a system of education, they still maintained the ancient usages and traditions of their predecessors. He congratulated the Mayor of Cambridge on being elected a second time to the chief magistrate's chair, and he also congratulated the town upon getting so able a representative in that capacity.

Mr. G. C. DRUCE, M.A., in seconding, said they highly esteemed the privilege of being present in those beautiful surroundings in a place so fraught with great history, and with the recognition of science which Cambridge had given, and he

thought they were extremely fortunate in having such a room as that they were met in. He looked upon it with envy; they had nothing like it in Oxford, and he was quite certain that in Oxford there was no contented professor (laughter). Someone once said, he thought of Oxford, that they heard a great deal about the endowments for research, but he thought it was rather a question in Oxford of research for endowments (laughter). He thought probably, from the expression that had fallen from their much respected Professor Seward, that his researches in every direction had been successful. They must also remember that within those walls was stored that great herbarium of Professor Babington, one of the greatest field botanists.

MR. FRANCIS RANSOM, F.C.S., then delivered

THE PRESIDENTIAL ADDRESS

During the forty-seven years of the existence of the British Pharmaceutical Conference, this is the first occasion on which we have had the privilege of meeting in Cambridge. As the seat of the University which has, perhaps, done more than any other to promote scientific research, and in which such research has been followed by the most brilliant successes, we may, I think, consider that Cambridge has bestowed upon us a special honour in inviting us to meet here this year. In looking through the list of those distinguished pharmacists who have preceded me in the chair, I can only regret that the honour of presiding on the present occasion has not fallen on one more worthy to occupy the position. In considering the subject for my address to-day, I was confronted with the difficulty that nearly every branch of pharmacy has been ably and exhaustively dealt with by my predecessors. I propose, however, to deal with some aspects of pharmaceutical research of the present day, and to endeavour to draw attention to certain directions in which progress may be anticipated. No real advance in any branch of science can be expected unless adequate attention be paid to the education of those who are to be responsible for its development. It cannot be too often pointed out that true education does not consist in the accumulation of a large number of facts, but in so training the mind that it shall be able to regard in true proportion the significance of all facts which may be presented. In the words of N. H. Martin in his pre-

sidential address at Bournemouth: "The function of education should be to make men accurate observers, so that they may have confidence that they see what they appear to do; accurate thinkers, so that they may reason with logical precision from the facts which they have observed; and above all accurate manipulators, so that they may use the instruments of science in a manner to eliminate a very common source of error, faulty workmanship." These words were spoken with special reference to the education of those students who in future should pursue research, and I maintain that they apply with equal truth to all branches of pharmaceutical education. Every practising pharmacist should be on the look-out for improved methods in the preparation of remedies, and having been trained in accuracy he may be certain that opportunities will occur of initiating improvements which will tend to the advancement of pharmacy.

Students and Research

Examinations are usually considered a necessary evil; they are not and never can be a sufficient test of competency. We may hope that in this country we shall see before long an enforced curriculum, which, in conjunction with examination, will ensure as far as possible that every pharmacist is a man deserving of his title. Having passed his Major Examination, it is most desirable that the student should, if possible, continue his education in the Research Laboratory of the Pharmaceutical Society or some similar institution. Here work can be carried on free from the trammels of examination requirements, and an opportunity be obtained for commencing original research. It is gratifying to see that our universities are now offering increased facilities to those who desire to study certain branches of science directly connected with pharmacy, and we may hope that actual pharmaceutical research may also be increasingly recognized and encouraged. It is much to be regretted that so large a proportion of students are now satisfied with the Minor qualification, and it is a question for the Council of the Society to consider how the Major Examination may be made more attractive. It is to be feared that the title of "Pharmaceutical Chemist" is not appreciated by the public, while the letters "M.P.S." are more likely to impress the general mind, and thus give a wrong idea as to qualification. A man who has spent sufficient time and money to obtain the Major qualification, especially

if that qualification also implies that he has passed through an adequate curriculum of study, deserves some title which shall be generally recognized as placing him in a position superior to that of the ordinary chemist and druggist. Having secured a supply of men who have time and ability to devote to original research, let us consider in what direction such investigations may be most profitably pursued. I should like to emphasize here a truth which, although generally acknowledged, has not been so fully acted upon as it deserves. In the words of a past President, the late H. B. Brady, "the attainments of the pharmacist must be complementary to those of the medical practitioner." This is profoundly true not only as referring to the everyday work of the pharmacist, but also in regard to the prosecution of original research. In looking back on the vast amount of work done during the last fifty years by pharmacologists on the one hand and chemists on the other, the question arises whether we might not have seen even more valuable results if there had been some more definite organization to bring together the two classes of investigators. New remedies are constantly being introduced, and while some seem destined to find a permanent place in medical practice, others after a few years disappear altogether, or are restricted to very limited employment. Medicines, like costumes, are subject to the vagaries of fashion, and what is valued in one generation may be discredited in the next, often to be revived in later ages. This may to some extent be accounted for by the changing conditions of life which, while eradicating one disease, may encourage another. As, however, many of these remedies claim to cure complaints which are always with us, their fluctuating reputations must depend also upon other causes. In some cases the therapeutic action obtained by the first observer has been found wanting when tried by others, and that which seemed likely to prove a valuable agent has been discredited. In other cases principles of known activity have been separated by the chemist, but having failed to obtain general recognition by the medical profession the drug is speedily forgotten. In order to establish the value or worthlessness of any remedy organized experimental investigation should be undertaken by the physiologist to determine its action, by the pharmacologist to confirm its remedial value, by the chemist to determine its composition, and by the pharmacist to devise suitable preparations. In many cases the botanist is also required to ascertain the species or variety of the plant

from which it is obtained. On rare occasions, such as seen in the classic work of T. R. Fraser on strophanthus, two or more of the above qualifications may be united in one man, but in most cases the success of the experiments in one branch of the subject is dependent upon the accuracy of the investigations undertaken from other sides. On looking through the *Year-Books of Pharmacy* we see records of an enormous amount of work done by chemists and pharmacists, both in this and other countries. A large portion of this work has been utilized by the compilers of pharmacopœias, and in other ways has been rendered of practical value. There remains, however, much valuable work which does not appear to have been adequately recognised by medical men. Some investigations, excellent in themselves as examples of the energy, ability, and perseverance of the research chemist, appear to have been devoted to subjects which a preliminary physiological examination would have shown to have been of no great importance from a medical point of view. The time and ability devoted to these subjects might, if directed to other problems, have cleared away many difficulties which have for long been encountered by the physician. In considering the directions in which research at the present time offers special opportunities, botany occupies a foremost place. Since this subject now receives so little attention in the medical curriculum, although at one time every medical school had its physic garden, it is all the more necessary that it should not be neglected by the pharmacist. From the vegetable kingdom the most potent, the most trustworthy, and the most generally useful remedies are still obtained. It is therefore of the first importance that correct botanical knowledge should be employed in selecting these species or varieties of plants which are best adapted for the purposes for which they are required. Pharmacognosy is now a recognized branch of the pharmacist's training. The microscopical structure of the various tissues of plants affords the means, formerly to a large extent neglected, of distinguishing the sources of drugs and of detecting sophistication and adulteration. In the cultivation of medicinal plants much has already been done, by the aid of practical botanical knowledge, in effecting improvements on the original strain. By varying the conditions of growth, by hybridization and by careful selection of seed, remarkable results have already been obtained. Cinchonas offer perhaps the best example of what can be done in this direction, the alkaloidal content of the barks cultivated

in the East showing a large increase on those growing in the native forests of South America. The attempt to control the proportions of the different alkaloids present, although not yet crowned with success, offers a promising field for further research. Coca affords another example of the improvement resulting from scientific cultivation in Ceylon and the East Indies.

Cultivation of Medicinal Plants

In the opinion of Tschirch much remains to be done in this direction in other medicinal plants which are or might be improved by cultivation. Chevalier has recently shown how the alkaloidal value of belladonna root may be increased by the employment of nitrogenous manures, while unaffected by potash and phosphates, and we may anticipate that further experiment in this direction will be followed by successful results. The cause of the temporary variation in the quality of certain drugs affords further scope for botanical investigation. For many years the jalap of commerce yielded from 10 to 20 per cent. of resin. A few years ago there commenced a gradual decline in percentage, until it was difficult to obtain tubers which would yield the 10 per cent. required by the British Pharmacopœia. During last year the roots became very scarce, and almost famine prices were paid for samples of poor quality. About nine months ago a sudden change occurred, importations became more abundant, prices fell, and at the same time the quality showed great improvement, there being plenty of jalap available containing 10 to 15 per cent. of resin. A somewhat similar experience has occurred in connexion with belladonna root, especially that imported from the Continent. A root containing 0·5 per cent. of alkaloid was at one time obtainable without difficulty, and 0·6 per cent. was occasionally met with. Then for some years it was difficult to find any containing 0·4 per cent., many samples yeilding only about 0·2 per cent. Recently there has been some little improvement, but there is still great difficulty in finding root of a high percentage. In both jalap and belladonna it is impossible to form any trustworthy opinion from general appearance as to the value of the drug. Whether the variations are due solely to the seasons, or whether there are other conditions affecting the constituents of the drugs is a subject inviting investigation. There are, however, other questions to be decided in the valuation of drugs besides the estimation of what are usually considered to be

the active constituents. Are the physiological properties of belladonna and jalap, for example, entirely due to the mydriatic alkaloids and the resins which they respectively contain? In the early part of the last century a great advance was undoubtedly made in our knowledge of drugs by the separation of alkaloids. In 1803 Derosne isolated narcotine, and Sertürner discovered morphine in 1816. Pelletier and Caventou separated quinine and cinchonine in 1820, and these discoveries were quickly followed by others which profoundly affected the administration of medicines. For a time it appeared as if galenical preparations were doomed, and empiricism would disappear with the advance of more strictly scientific methods. If the active constituents of drugs could be separated in a pure state, what further use could there be for tinctures, extracts, and other preparations which undoubtedly contain material which can have no medicinal value? We find, however, that the demand for these somewhat crude preparations still continues, not only in those cases in which no definite active principles have been separated from the drug, but also in such as cinchona, belladonna and nux vomica, from which alkaloids possessing well-defined physiological activity are readily available. This question, although essentially one for the therapeutist to decide, is of great interest to the chemist and the pharmacist. It was referred to by Dr. Thoms in his important communication to the International Congress of Applied Chemistry held in Berlin, 1903, on the "Valuation of the Narcotic Extracts from the Chemical and Pharmacological Standpoint." From the data given in this paper and in that which followed by the late Professor Liebreich, and also from the views expressed in the discussion which followed, it was inferred that there is a general opinion that the value of these preparations is not entirely dependent upon the alkaloids which they contain, but is also to some extent governed by other constituents present. Kraemer, in a recent paper on "Pharmacognosy and the United States Pharmacopœia," also accentuates the decided opinion expressed by various authorities that few, if any, isolated substances tested pharmacologically produce the results obtained from the drugs themselves. The same point was also emphasized by Tschirch in his recent inaugural sessional address delivered at a meeting of the Pharmaceutical Society of Great Britain. If all the beneficial results of belladonna, cinchona, and nux vomica can be obtained by the employment of the separated alkaloids, the sooner

that the galenical preparations of these drugs become obsolete the better. As, however, there appears no prospect of these preparations being discarded, it is the duty of the pharmacist to ascertain as far as possible the best methods for their production. It is here absolutely necessary that the medical man and the pharmacist, the physiologist and the chemist, should together investigate the relative value of the different preparations. The most elegant preparation is not necessarily the most effective, and if the object be to eliminate as far as possible all constituents except the alkaloid itself, we may naturally arrive eventually at a mere solution of such alkaloid. The question as to what should be retained and what eliminated in a perfect pharmaceutical preparation is a matter of difficulty, and can only be definitely answered from experimental data. There are still many drugs from which no definite active principle has yet been separated, while in others there are so many constituents of known physiological activity that by eliminating some a very different result from that required may be obtained. In the case of drugs containing alkaloids of known physiological value, such as belladonna and cinchona, it is desirable that these alkaloids should as far as possible remain in combination with their natural acids. The physiological action of an alkaloidal salt may be to some extent modified by the acid. The alkaloids of belladonna are known to be chiefly in combination with malic acid, and as far as possible this combination should be left undisturbed. The tannin and even the carbohydrates present may also be of importance, and further investigation is required to determine how far they should be retained, eliminated, or ignored. The relative proportion of the three alkaloids, atropine, hyoscyamine, and scopolamine varies much in different specimens of belladonna root and leaves and in their preparations. The proportion of each alkaloid may vary in the drug according to the age of the plant when it is collected, to the conditions of growth, and to the methods of drying. When dried very slowly by exposure to the natural heat of the sun fermentation may be promoted, which may cause various changes in the constituents. On the other hand, when dried rapidly by kiln heat an altogether different set of changes may be effected. Still further alterations in the constituents of the drug may result from imperfect storage, due to a damp atmosphere or the attacks of insects. In the case of cinchona it is well known that the cultivated barks of the East are very different in composition from those obtained

originally from the indigenous trees growing on the slopes of the Andes. A tincture or decoction from the present official red bark may be very different in action from those which were prepared from the South American yellow bark thirty or forty years ago. In the case of the present official liquid extract the employment of hydrochloric acid to facilitate the extraction of the alkaloids may altogether upset the natural combinations. It is interesting to notice that there is still a demand for the old liquid extract of the 1867 Pharmacopœia, where water is the only solvent employed. The experience of pharmacologists has proved that the rates of absorption of alkaloids vary according to the acids with which they are combined, and we may, therefore, expect different results to be produced by the hydrochlorides of the alkaloids in the present official extract from those obtained when the alkaloids were in combination with their natural organic acids as formerly. If the effects of the hydrochlorides of quinine and the other cinchona alkaloids are required, these may be readily obtained by the use of the pure alkaloidal salts.

Investigation of Galenical Preparations

Few galenical preparations have been subjected to so much investigation as those of ipecacuanha. From the amount of literature which has been published on the methods for preparing the wine, and the pharmaceutical experience and skill which have been devoted to the subject, we might have hoped that a thoroughly satisfactory formula would have been attained. Much of the difficulty has doubtless arisen from the variability of the sherry which may be employed in the preparation. Having found that acetic acid was a good solvent for the alkaloids of the root, the 1885 Pharmacopœia introduced a wine prepared from an acetic extract. Here we have an evident case in which the best solvent for the alkaloid is not necessarily the best menstruum for exhausting the drug. The acetic acid doubtless altered the natural combinations of salts in the root, the heat employed in evaporating the acidified solution probably induced further changes, and the final result has been generally condemned as an unsatisfactory preparation. The formula of the 1898 Pharmacopœia is a very distinct advance, and the standardization of the alkaloids has produced a wine whose efficacy can be much more relied on than formerly, but it is a question whether the introduc-

tion of lime into the final extraction in order the more completely to exhaust the root is a desirable addition. In the forthcoming edition of the German Pharmacopœia it is proposed that the wine, hitherto official, shall be omitted, and that it shall be replaced by a tincture. A standardized tincture would probably be a more uniform and stable preparation, and it may eventually replace the wine of our own Pharmacopœia. Although the alkaloids of ipecacuanha are well known, and exert the general physiological activity of the root, there is no indication that either the root itself or its galenical preparations are likely to be discarded in favour of the chemically pure principles. For certain purposes, including its value as a remedy for dysentery, it has been shown that the alkaloids alone do not possess the properties desired, and the root from which these alkaloids have been nearly or entirely removed has been found to be more efficacious than the natural drug. In referring to the above instances I do not wish for a moment to disparage the advance which has been made during recent years in the various processes of standardizing pharmaceutical preparations. There can be no doubt that the chemical standardization of the most important active constituents has done much to promote an approach to uniformity in a class of remedial agents which at one time were peculiarly liable to variation. I do, however, maintain that absolute uniformity in therapeutic action cannot be expected from any form of standardization which takes account only of one active constituent. One of my distinguished predecessors in this chair, in his presidential address at Birmingham in 1905, entered very fully into the official processes for standardizing galenical preparations, and made valuable suggestions for their improvement, and for introducing fresh processes for other drugs. He recognized the danger of restricting the medicinal properties of a drug to a single potent principle, and this danger I desire to emphasize, both in the official preparations which are at present standardized, and in others which may be introduced in the future. In nux vomica, brucine is generally supposed to have some physiological action, though less potent than strychnine. While fixing the amount of strychnine to be present in the extract and tincture, the percentage of brucine is disregarded, although very variable. In opium many alkaloids having different medicinal properties are present, although the percentage of morphine only is defined. The mydriatic alkaloids of belladonna, although similar in properties, are not identical. If an attempt be made to standar-

dizè the preparations of hyoscyamus we have the two alkaloids hyoscyamine and hyoscine in variable proportions, and the properties of these are known to be different.

That those which have long been regarded as active principles may not even be pure chemical bodies has been recently shown in the interesting work by Power and Moore on elaterium. These authors have shown that the elaterin, of which the British Pharmacopœia requires 20 to 25 per cent. to be present, is itself a mixed substance containing varying proportions of pure β-elaterin, which alone has any physiological activity. There are, and porbably will always be, many drugs whose preparations it will be impossible to standardize by any chemical methods. Rhubarb contains emodin, chrysophan, rheotannic acid, and probably other more or less active constituents. Cascara sagrada is also said to contain emodin, chrysophan, and a variety of tannin. The combination of these with other substances produce the results required, but the composition is altogether too complex to permit of any form of assay to be introduced into their preparations. In the use of these and many other remedies medical men must still be guided by the knowledge derived from experience. Pharmacists can do little beyond exercising care in selecting genuine drugs and providing preparations of them which experience has shown to be effective. There are, however, certain drugs which, while not adapted in our present state of knowledge for chemical standardization, can be tested for their activity by physiological methods. The valuable papers contributed to the Conference by Dr. Dixon in 1905 and Dr. Martin in 1909, and the interesting discussions which followed, indicate that pharmacists are alive to the importance of this branch of research, although they are debarred from taking any active part in the investigations. If, as has been suggested, physiological tests should be introduced into the Pharmacopœia for preparations of such drugs as cannabis, digitalis, squill, and strophanthus, it will be necessary to obtain some relaxation of the present law which regulates experiments upon animals. As the Pharmacopœia is the recognized guide to pharmacists for the preparation and examination of medicinal products, it would manifestly be unfair to introduce tests which could only be performed by medical men holding the necessary licences. If qualified pharmacists could be granted modified licences to perform the necessary physiological tests for preparations of digitalis, squill, and strophanthus, it might result in a general improvement in these

important remedies. Such licences should, of course, only be given to pharmacists who have undergone a course of training in physiological assaying, but if the processes become officially recognized in the Pharmacopœia we may perhaps hope that such training will become a part of the recognized curriculum for the Major qualification. It is generally recognized by medical men that no standardization, either chemical or physiological, will absolutely ensure that the desired results will be obtained, and owing to individual idiosyncrasy, each patient has by experiment practically to be standardized by the drug before the correct dose can be determined.

Standardization of Disinfectants

The standardization of disinfectants is a subject which has recently received much consideration, and which must be of great importance and interest to pharmacists. The difficulties met with in the investigation appear to be as great, or even greater, than those encountered in the standardization of drugs. A true disinfectant must not be simply a germicide, but also have the power of decomposing and rendering innocuous the poisonous substances produced by the micro-organisms of disease. The conditions in which the disinfectants are to be used have also to be considered, such as the temperature during the process of disinfection, the presence of foreign substances, and the variety of micro-organism which is the cause of the trouble. Neither the chemical nor bacteriological processes which have hitherto been devised seem to be applicable in all cases, although for specific purposes comparisons of efficiency may be deduced. I am very pleased to see that we are promised papers on this subject during the present sitting of the Conference, and we may confidently anticipate further light on a difficult question.

Another subject of deep interest to pharmacists, although outside the scope of their ordinary work, is the relation of chemical constitution to physiological action and the production of synthetic remedies. Although the time is probably still far distant when the medical man will be able to rely entirely on the chemist for the synthetic production of compounds possessing any required physiological activity, some progress has already been made in this direction. In the case of ergot an active principle (*p*-hydroxyphenylethylamine) has recently been separated from the aqueous extract, having the power of increasing the blood pressure. This compound, which can be produced synthe-

tically, is found to bear a close resemblance in constitution to adrenaline, which has the same physiological action. By thus comparing the constitution of active principles from different drugs similar in physiological action, it may be possible to produce a synthetic remedy having the advantages of each and free from any deleterious properties. Thus eventually in the distant future, when chemistry and physiology have sufficiently advanced, it may be possible to build up synthetically all the remedies that may be required. The synthetic remedies which have appeared since the introduction of antipyrin in 1883 must be counted by hundreds, and although many have had a very evanescent popularity others remain as most valuable drugs. One of the most interesting of these products resulted from the investigation of the anaesthetic action of the derivatives of cocaine. The result was the production of the β-eucaine possessing similar anaesthetic properties, but being almost free from the toxicity of the natural alkaloid.

Pharmacists and the Pharmacopœia

The progress in pharmacy and pharmaceutical research is, or at least should be, to a large extent reflected in successive editions of the official pharmacopœias. As the British Pharmacopœia, with its Indian and Colonial Addendum, is now the official guide throughout the British Empire, it is of supreme importance that it should be compiled by the authority of those whose scientific and practical knowledge render them the most competent to perform the work. The British Pharmacopœia, as stated on the title-page, is published under the direction of "The General Council of Medical Education and Registration of the United Kingdom." Although in the preface to the last edition an acknowledgment is made of the assistance rendered by "a Committee of the Pharmaceutical Society of Great Britian," it is the members of the General Medical Council who are solely responsible for its production. In this respect our Pharmacopœia differs essentially from those of most other countries. I find by reference to those issued in recent years that in nearly every instance the national pharmacopœias are revised by commissions on which pharmacists as well as medical men are represented. In the case of the United States of America the Convention is almost equally divided between representatives of medicine and pharmacy. In most of the other countries it will also be found that

pharmaceutical associations and colleges send representatives, who not only advise but have direct responsibility in the revision. In former times the education and experience of the medical man gave him a much more intimate acquaintance with pharmacy than at present, and it would appear that the changed conditions are hardly sufficiently recognized in this country. The fact that the General Medical Council has invited the assistance of the Pharmaceutical Society is a step in the right direction, but I venture to suggest that a more direct recognition of pharmacists in future revisions would be found to embody more fully the results of pharmaceutical research in our national Pharmacopœia. In a practical paper by Dott at the last meeting of the Conference, valuable suggestions were made as to the reduction of the alcoholic strength of tinctures and other preparations, whereby economy might be obtained without any loss in efficiency. This is only one of many instances in which the knowledge of the practical pharmacist would be of value. In regard to pharmaceutical chemicals, it is generally recognized that in some cases the tests for purity have been unnecessarily stringent, while in others the requirements might be made more strict. Here also the practical knowledge of the manufacturer and the dispenser would supply the information that is required. In order to make the Pharmacopœia imperial rather than national in character, it would also seem desirable that India, Canada, and other Colonies should appoint medical and pharmaceutical representatives, who should also have direct responsibility in the revision.

During the past year a conference has been held between representatives of the British Medical Association and of the British Pharmaceutical Conference, with a view to forming a joint standing committee "to collect data and to promote the realization of aims found to be held in common by both bodies." It remains for the members of the two associations, if they approve the scheme, to elect at their respective annual meetings representatives to serve on this joint committee. As there are many objects which the two associations have in common, it is much to be hoped that the committee may be appointed, and there will be an opportunity during the present session for our members to discuss the matter.

Although not contemplated for this specific object, I would suggest that this or a similar appointed joint committee might be of much value in organizing research work, and thus bringing

together medical men and pharmacists for the purpose I have mentioned earlier in my address. We issue every year a list of subjects upon which it is suggested that work should be undertaken. Would not these suggestions be of increased value if they emanated from a committee on which both associations were represented? By providing the means of putting the medical man and the pharmacist into direct communication, I believe that such a committee might render much assistance in the promotion and prosecution of original research.

Amongst those who have been removed by death since our last meeting we have to record the loss of Octavius Corder, a distinguished pharmacist who presided over the meeting of the Conference in Nottingham in 1893. He was an enthusiastic botanist, and it will be remembered that in his presidential address he dealt with medicinal plants in common cultivation, and indicated of how great importance and interest botanical knowledge is to the practical pharmacist. May his life be an incentive to many a pharmaceutical student to pursue botany, not only for its practical value, but also for the pleasure to be derived from the study of plants in spare moments.

By the death of Michael Carteighe British pharmacy has lost one of its most distinguished members, and the Conference a past Vice-President. and Hon. General Secretary. It would be safe to say that no member of our craft has devoted more time, energy and ability to the cause of pharmacy. We have also to deplore the loss of Charles Ekin, who, especially in the early days of the Conference, rendered valuable assistance by his contributions to pharmaceutical research, and who occupied the position of Treasurer from 1877 to 1884.

In conclusion I would appeal to members to do all they can to increase the membership, and to make the Conference more thoroughly representative of British pharmacy, not only the pharmacy of Great Britain, but of the British Empire. We are always pleased to see a good contingent of our Irish members, and we usually have the pleasure of the company of some pharmacists from India and the Colonies. Let us remember that one of the original and most important objects of the Conference is to promote the friendly union of those interested in the advancement of pharmacy. There must always be many who are unable to join in our annual meetings, but to all our members throughout the Empire and abroad we desire to send a message of hearty greeting, and to ask them to regard membership of the British

Pharmaceutical Conference as a bond of union and good-fellowship.

VOTE OF THANKS TO THE PRESIDENT

Mr. N. H. MARTIN (Newcastle) said they were grateful that their President, who had been called upon to face a serious illness, had so far recovered as to be present. They congratulated him and his family, and hoped the duties and responsibilities of the week would not in the least degree retard his recovery. He had chosen a subject in which he was *par excellence* a master, and his address would possess great value in the annals of their proceedings. He ventured to suggest at Oxford that he hoped the time would soon come when their older universities would have a curriculum and degrees in pharmacy, just as in medicine; but the hope seemed vanishing. In further remarks, Mr. Martin endorsed the President's observations on the subject of proper scientific cultivation of medicinal plants, and of the recognition of pharmacists in the preparation of the Pharmacopœia.

Mr. W. A. H. NAYLOR seconded, and emphasized the point that unless the present generation sought to qualify themselves for research of the character which would be demanded in the future, especially with reference to the examination of crude drugs, that class of work would pass out of their hands into those of others, and he thought that would be greatly to their detriment (hear, hear).

The vote was carried with enthusiasm, and briefly acknowledged by the President.

APOLOGIES FOR ABSENCE

Mr. E. SAVILLE PECK, M.A., next read a number of apologies for absence. Dr. Attfield very much regretted that an attack of neuritis imprisoned him, and thereby prevented him attending the meeting. He trusted the Conference would have a very successful meeting. Mr. Charles Umney very much regretted that he would be unable to be present. Messrs. S. R. Atkins, W. L. Currie (Vice-President of the Pharmaceutical Society), Peter Boa, E. W. Pollard, J. Dolbear, D. Lloyd Howard, P. MacEwan, J. P. Kay, J. H. Cuff, H. E. Boorne, C. Symes, R. Wright and A. Middleton also wrote expressing regret at their unavoidable absence.

REPORT OF THE EXECUTIVE

Mr. E. SAVILLE PECK read the report of the Executive Committee of the Conference, as follows :—

"Your Committee wish, in the first paragraph of its Annual Report, to express to the members of the British Pharmaceutical Conference its deep sense of the severe loss which pharmacy has sustained by the death of the late Michael Carteighe. As Hon. Local Secretary at the meeting in London in 1874, as Hon. General Secretary from 1880 to 1882, and as Vice-President from 1883 to 1896, Mr. Carteighe showed his active interest in the welfare of the Conference, as in all other movements which had at heart the best interests of pharmacy. We have also to record the death of Octavius Corder, who filled the presidential chair when the Conference met in Nottingham in 1893. Also of Charles Ekin, who was Treasurer from 1877 to 1884, and contributed valuable papers to the annual meetings.

"Since the last Conference the Executive Committee has met on six different occasions, and the meetings have been attended by a large proportion of the members.

"At the annual meeting at Newcastle, after the discussion upon the question of confining the dispensing of medical prescriptions to pharmacists, the following resolution was unanimously carried :—'That this matter be referred to the Executive Committee to consider and if thought desirable to confer with the British Medical Association in reference to it.' After considerable correspondence, extending over several months, a Conference was arranged and took place on Thursday, May 19, at 429, Strand, the offices of the British Medical Association, under the Chairmanship of Mr. Edmund Owen (Chairman of Council of British Medical Association). There were present, as representatives of the British Medical Association, Dr. Edwin Rayner (Treasurer), Dr. Munro Moir, Mr. C. R. Straton, Dr. C. H. Wise, Dr. J. H. Taylor, Mr. Smith Whitaker (Medical Secretary), and as representatives of the British Pharmaceutical Conference, Messrs. J. F. Tocher (ex-President), H. Wippell Gadd, G. C. Druce, W. F. Wells, R. Wright, A. McMillan, F. W. Gamble, C. T. Allen, J. Righton, T. Maltby Clague, and E. Saville Peck (Hon. Secretary). Dr. Smith Whitaker reported that the Conference was the outcome of correspondence between the British Pharmaceutical Conference and the Council of the Association, through its Medico-Political Committee. The discussion, which was both interesting and valuable, turned principally upon :—

"(*a*) Medical dispensing, its extent, whether it should be transferred to pharmacists, and if so, how the transfer could be effected.

"(*b*) The nature and extent of prescribing by unqualified persons, and the means by which it may be prevented.

"(*c*) The possibility of co-operation in action concerning the sale of dangerous, secret, or useless nostrums.

"The question was considered as to the expediency of forming a Joint Standing Committee, composed of members of the British Medical Association and the British Pharmaceutical Conference, to collect data and to promote the realization of aims found to be held in common by both bodies. It was eventually decided by the Conference that the members of the Conference recommend to their respective bodies the institution of a Joint Standing Committee, consisting of at least ten members of the British Medical Association and ten members of the British Pharmaceutical Conference. The Conference left in the hands of the Chairman and the Secretaries the work of preparation leading up to the institution of the said Joint Standing Committee. The Executive recommend the members of the Conference to proceed to the institution of this Joint Standing Committee, and suggest that those who were selected to represent the British Pharmaceutical Conference at the meeting in May be elected to serve on the Joint Standing Committee.

"On December 1, 1909, a deputation from the Federation of the Local Pharmaceutical Associations was received, consisting of Mr. W. L. Currie (Chairman), Mr. Edmund Jones (Hon. Secretary), and Mr. J. C. Pentney, with the object of putting before the Executive the views of the Edinburgh District Chemists Trade Association, with regard to the formation of a Commercial Section of the B.P.C.

The matter was gone into very thoroughly, and various opinions for and against the formation of such a section were advanced. After a lengthy discussion the following resolution was unanimously carried :—

> " 'That with a view of testing the value of the suggestions made by the deputation of the Federation, and also of gauging the opinions of the members of the Conference generally, the Federation of Local Pharmaceutical Associations be asked to arrange for and to conduct a meeting on the lines indicated by the deputation on the afternoon of Tuesday in the Conference Week at Cambridge, July, 1910.'

"The resolution was forwarded to the Honorary Secretary of

the Federation, and he replied that the Federation would arrange such a meeting. Mr. J. C. Umney at the same meeting gave notice that he would move 'That Article I, Object 4, of the Constitution shall read after the word "established," for the advancement of the science and practice of pharmacy.' This resolution will be submitted to the members at their meeting on Thursday, July 28.

"The Research Sub-Committee was reappointed in October, and proceeded to revise the list of subjects for research. Suggestions were invited from various workers, and the replies, which in some cases were very valuable, received the careful consideration of the Sub-Committee. The revised research list was distributed, and through the courtesy of the editors was published in the journals. A Sub-Committee was also appointed to consider if any economies and improvements could be effected in the production of the *Year-Book.* It is hoped that it may be found possible to slightly extend the abstracts and modify their arrangement so as to increase their usefulness.

"All the Local Corresponding Secretaries have been written to asking them to furnish names of likely members, and for any suggestion they may have for rendering the Conference more useful to the practising pharmacist. Replies were received from the majority, and letters were sent to those whose names were submitted. Those members in arrear have been asked to remit their subscriptions, and a fair number have replied with enclosures.

"An effort has been made to attract to the meetings at Cambridge several Colonial pharmacists now in this country, and we take this opportunity of drawing attention to the fact that our constitution admits them as members, and we would heartily welcome those who wish to join. The Executive has used every endeavour to make the Conference as successful as possible, and ventures to appeal definitely to pharmacists to respond to their efforts by largely increasing its membership.

"The thanks of the Conference are due to the Council of the Pharmaceutical Society for the use of a room for the Executive meetings, and also to the Editor of *The Pharmaceutical Journal* for the valuable reprints of the papers."

Treasurer's Report

Mr. John C. Umney presented the financial statement of the year. The report was as follows:—"When I last had the

pleasure of reporting to you on the finances of the Conference I was able to say that the position of the Conference was better than it had been for many years past, the balance on the 1st of July, 1909, being £5, as against a considerable deficit in previous years. The rearrangement, however, of the financial year of the Conference, by which now the period of subscriptions covers the entire year from the 1st of January to the 31st of December, somewhat modified the financial statement. It is, however, hoped that each financial year will now absolutely cover its own expenses, by which I mean that the subscriptions received during 1910 will pay for all expenses during the year, including the publication of the *Year-Book* and the Editor's salary. This has not previously been the case, the *Year-Book* being paid for only in small part during its current financial year. I am pleased to be able to report to you that £173 in subscriptions has been received during the last six months of 1909, and £230 during the first six months of 1910, making in all a receipt from subscriptions of £403. After discharging all our liabilities, this will leave us with a balance in hand on the last day of June of £128. The audited balance sheet up to the 31st December, 1910, will be distributed to the members when the usual request is sent out for their subscriptions in January, 1911."

On the motion of Mr. R. A. ROBINSON, seconded by Mr. JOHN SMITH, the report and financial statement were adopted.

The reading of papers was then proceeded with.

THE BACTERIOLOGICAL STANDARDIZATION OF DISINFECTANTS

BY PROF. SIMS WOODHEAD AND DR. CONSTANT PONDER

For some time past we have been engaged on the study of some of the factors that must be taken into consideration in the determination of the value of a disinfectant. In common with other workers, we were confronted, almost at the commencement of our investigations, by the difficulty of obtaining any reliable method of standardizing this value under what may be termed practical conditions of disinfection, and, in common with others, we had to fall back on a comparative valuation, taking phenol (carbolic

acid) as our standard. Elsewhere (*Lancet*, November 20, 1909), we have given a brief sketch of the methods that have, from time to time, been employed by various workers to attain this end, and we there gave our reasons for our adoption of a modification of the Rideal-Walker drop method in carrying on our work.

In this short note we wish to make clear our position in regard to this question of standardization of disinfectants.

In view of the great demand for reliable antiseptics and disinfectants, there have been placed on the market a large number of these reagents, many of them coal-tar product emulsions, for which have been claimed very high carbolic acid coefficients. Had the makers of these various disinfectants been able to agree as to the relative value of their products, it would not have suggested itself to us that we should investigate this question, but such divergent results were obtained and reported by different observers that it was evidently a matter of some difficulty to obtain a common basis of comparison. On taking up the work we realized at once that the Rideal-Walker drop method gave promise, from the theoretical point of view, of the most precise results; we realize, further, that before much knowledge of the process of practical disinfection could be gained, the question would have to be studied, in great detail, from the theoretical point of view. Moreover, the coal-tar emulsions had been standardized by the R.-W. method, so that we had a further reason for adopting this method, with which we made a series of preliminary experiments, following out the details as published by the authors, and summarized with such care and accuracy as we could command by Mr. Partridge. Our results, however, were so disappointing, in so far that they were extremely irregular, that we came to the conclusion that whatever results it might give in the hands of those who were constantly using it, it was not a method by which, in the hands of casual, though fairly skilled, workers, consistent results could be obtained.

On analysing the process, we picked out the following factors, and gave to each some consideration :—

Organisms to be acted upon.—In this country disinfectants are used mostly to render inactive the pathogenic organisms found in sewage. In the R.-W. method *B. typhosus* is used as being the most common of such organisms. Finding that the *Bacillus coli communis* is only slightly more resistant than the *B. typhosus*, we determined to use it as our test organism, in the first instance, at any rate; firstly, because it is non-pathogenic,

and is therefore less dangerous to work with, and, secondly, because its presence can be so readily recognized by the use of McConkey's bile-salts-litmus medium, without the use of the microscope, and with great certainty, because of the formation of acid and gas, through which we get marked turbidity and change of colour—from blue to red—as the organism multiplies in the medium.

Number of Micro-organisms and Amount of Organic Matter to be added.—We soon convinced ourselves that the number of micro-organisms must be fairly large, if consistent results are to be obtained, i.e., must be so large that allowance is made for a considerable margin of error. This margin of error is enormously greater where small quantities of a culture are taken with an öse than when larger quantities are taken with a spoon. The same applies to the amount of organic matter introduced along with the micro-organisms. How important is this latter factor may be gathered from the fact that in a series of experiments with chloro-hypochlorite of lime (bleaching powder) the addition of 0·3 c.c. of broth to a litre of water interfered with the bacterial power of the "bleach" to such an extent that instead of killing something like 258,000 in every 258,010 b.c.c., it killed only 73 in 74 b.c.c. What applies in the case of bleach probably applies also in the case of other disinfectants. This factor must certainly be borne in mind and reckoned with.

Strength and Number of Dilutions.—These should be as close together, but should extend over as wide a range as possible, in order that full data may be obtained. Further, the intervals between each should be, as far as possible, equal, and should take the form of a percentage difference. Only when we have these points can the curve described below be satisfactory.

Time during which the Disinfectant is allowed to act.—In making an experimental observation the time factor must be more or less arbitrary, but taking into consideration the fact that certain antiseptics appear to give their maximum results in a comparatively short time, whilst others take a somewhat longer time to give their best results, it appeared to be more fair to all the disinfectants examined to take a mean between two extremes than to take any fixed point between those extremes.

Temperature.—As most of the standardization experiments have been carried on in climates within the temperate zone, we adopted a more or less arbitrary temperature, the mean temperature met with in that zone, at which to carry on our experiments.

It will probably be found well, however, in making a test, to have the temperature at which the solutions and emulsions are kept approximately that at which the work of practical disinfection is to be carried on, say, in South Africa on the one hand, or in Northern Europe or America on the other. We suggest this with confidence because we now have evidence that the carbolic acid co-efficient of a disinfectant may vary enormously according as we are working with solutions and emulsions kept at 55° F. from that obtained when they are maintained at a temperature of 80° F. This, of course, has long been known, but we believe that even now its great importance has not been realized.

With our apparatus (demonstrated), of which we have now wide experience, we have been able to obtain from the very outset of our work most consistent results. Many of these have been published, and we hope to publish others very shortly. Here we give only a simple table, as our object is not to make a comparison between different disinfectants, but to make clear the basis and method on and by which we work.

TABLE

Minutes	Dilutions											
	$\frac{1}{140}$	$\frac{1}{160}$	$\frac{1}{180}$	$\frac{1}{200}$	$\frac{1}{220}$	$\frac{1}{240}$	$\frac{1}{260}$	$\frac{1}{280}$	$\frac{1}{300}$	$\frac{1}{320}$	$\frac{1}{340}$	$\frac{1}{360}$
	0·714 %	0·625 %	0 555 %	0·500 %	0·454 %	0·416 %	0·384 %	0·357 %	0·333 %	0·312 %	0·294 %	0·277 %
2½ .	0	24	18	16	13½	13	13	12½	—	—	—	—
5 .	0	0	0	18	17	13½	13½	13	—	—	—	—
7½ .	0	0	0	0	19	15½	16	13½	—	—	—	—
10 .	—	0	0	0	0	18	15½	14	13½	—	—	—
12 .	—	—	0	0	0	19	16	15½	13½	—	—	—
15 .	—	—	—	0	0	19	19	15½	15½	13½	—	—
20 .	—	—	—	—	0	0	0	18	14½	13½	—	—
25 .	—	—	—	—	—	0	0	0	17	14½	13½	13
30 .	—	—	—	—	—	—	0	0	17	14½	13½	13½

Carbolic Acid Control

Minutes.	Percentage Dilutions.							
	1·10	1·00	0·917	0·846	0·786	0·733	0·687	0·647
2½	0	0	16	16	—	—	—	
5	0	0	0	17½	—	—	—	
25	—	—	—	—	0	0	18½	18
30	—	—	—	—	0	0	0	18

Room temperature 63° F.

The co-efficient of this disinfectant is, therefore:

$$\frac{\frac{1\cdot00}{0\cdot714} + \frac{0\cdot687}{0\cdot357}}{2} = \frac{1\cdot4 + 1\cdot9}{2} = 1\cdot65.$$

As mentioned elsewhere, we lay great stress on obtaining a complete chart from which to construct a curve—i.e., from the data obtained from both time and dilution factors. Along this curve it will be seen that the figures derived from our table check one another very closely, the intermediate figures, though not used in our calculation, being of considerable value in building up the general picture of results. The figures we use are those obtained at the extreme points of our curve, the mean between these being taken to indicate the carbolic acid co-efficient of the disinfectant.

Finally, it is evident that all comparisons as regards the germicidal activity of disinfectants can be accepted as reliable only under the conditions obtainable, these, at present, being of the simplest and most limited character. These comparisons must, however, be made and deductions drawn therefrom before any further advances can be made, as germicidal activity must necessarily be taken as the basis of disinfection, whatever other factors may ultimately have to be introduced. It is obvious that as the experiments carried out deal with a simple organism only the carbolic acid co-efficient of any disinfectant so tested applies to that organism only, and for practical purposes it will be necessary to obtain the co-efficient for the special organism that has to be dealt with in the disinfecting process. Some further modification of our method, apparatus, and media may, therefore, be required to meet special cases and circumstances.

In the course of the discussion, those who differ from us will, of course, assert their own position. All we ask is a careful consideration of our facts before our inferences therefrom are criticized. No one recognizes more clearly than do we that as yet the whole question is still in the melting pot, and in a very marked stage of flux and change. We put nothing forward as final or conclusive, but we do claim that our method and results, the most consistent yet obtained, shall be considered as a careful, impartial, and conscientious effort to add something to our knowledge of the standardization of disinfectants.

Our interest is absolutely impersonal. We have no desire to magnify or minimize the well-grounded claims made for any disinfectant on the market. Our one aim is to obtain knowledge of the actual and relative germicidal value of disinfectants, and therefore to improve the process of disinfection.

BACTERIOLOGICAL TESTINGS OF CERTAIN DISINFECTANTS AND THE RESULTS AS AFFECTED BY VARYING CONDITIONS [1]

BY C. T. KINGZETT, F.I.C., F.C.S., AND R. C. WOODCOCK, F.I.C., F.C.S.

This investigation deals largely with a considerable number of commericial disinfectants of the coal-tar order (including all the better known ones) purchased in the ordinary way of trade, and covers a period ranging from May, 1908, to September, 1909. Their normal Rideal-Walker co-efficients in respect of *B. typhosus* were first of all determined, and the results of that part of the investigation are shown in the first column of Tables 1, 2 and 3, the preparations being numbered in respect of the order of their co-efficiencies. Similarly, what may be called the normal co-efficients with respect to other germs were next determined under the conditions indicated, and then the investigation was extended to ascertain the possible influences of (*a*) higher temperature as affecting the *B. typhosus* co-efficient, (*b*) an extension of time, and (*c*) an extension of time coupled with a higher temperature.

The results speak for themselves to a large extent, but in order that a proper comparison of the results should be made, it is desirable to state that the disinfectant which is numbered

[1] Communication from the Laboratories of the Sanitas Co., Ld.

"2" in the first table is allied in character with "Sanitas-Okol," in the sense that both are ready prepared emulsions, whereas all the other preparations, numbered 3–12, were of a homogeneous character; that is to say, clear translucent liquids which yield milk-white emulsions when admixed with water.

TABLE 1

No. of Sample.	R.-W. Co-eff.	*B. coli* + 15 Broth.	*Staph p. aureus* +15 Broth.	*Staph p. aureus* −1 Broth.	*B. diph*[1] −1 Broth.	Temp 37° C. *B. typh.*+15 Broth.	Time extended to 1–1¼ hours. *B. typh.* + 15 Broth at Normal temp.	Temp. 37° C. and time extended to 1–1¼ hours. *B. typh.* +15 Broth.
EMULSIFIED DISINFECTANTS.								
1 "S.-Okol"	22·0	18·6	10·9	18·3	28·0	19·0	20·5	15·0
2 . .	18·0	13·7	9·3	—	19·1	16·6	17·25	12·9
HOMOGENEOUS DISINFECTANTS, ETC.								
1 "S.-Bactox"	20·0	16·3	11·3	—	35·0	31·5	21·2	19·0
2 . .	19·0	15·3	8·0	15·6	28·0	—	—	—
3 . .	18·0	14·0	5·3	11·8	20·0	—	—	—
4 . .	17·0	13·4	9·3	—	—	—	—	—
5 . .	16·0	11·8	7·25	12·0	24·0	22·5	20·0	14·5
6 . .	12·0	10·0	5·3	9·1	13·3	—	—	—
7 . .	9·5	8·4	—	—	—	—	—	—
8 . .	2·5	2·3	0·8	1·1	3·5	—	—	—
9 . .	2·4	2·1	1·3	—	4·3	—	—	—
10 . .	2·3	2·1	2·0	—	4·6	—	—	—
H_2O_2 9–10 vols. .	0·04	0·04	—	—	—	0·09	0·20	0·39
Formaldehyde, 37% to 39% .	0·35	0·30	0·19	—	—	0·43	0·91	1·8

Compare also Table 2.

It must always be borne in mind that the Rideal-Walker test is only serviceable for ascertaining the comparative germicidal values of coal-tar disinfectants under the particular conditions of that test, and is useless for determining the real dis-

[1] The following changes were made from the normal R.-W. method in order to get more uniform results, as this germ was found difficult to work with under normal conditions. The culture in broth was a forty-eight hours' growth. The broth used was —1. Ten drops of the culture were used and two loopfuls taken for the sub-culture. Incubation for four days.

infectant values of these and other preparations as employed in actual practice.

By way of illustrating the inefficiency of the Rideal-Walker test for determining the comparative disinfectant values of other disinfectants than those of a coal-tar nature, we may call attention to the above results concerning peroxide of hydrogen of 9–10 volume strength and formaldehyde of 37 per cent. to 39 per cent. strength.

To any one acquainted with the real value of these two preparations, it must seem absurd to suppose for one moment that they are expressed by the very insignificant figures shown in this table. In other words, while the Rideal-Walker test may very well serve to determine the relative germicidal values of similarly prepared preparations of a coal-tar nature, it is not applicable for ascertaining the real or relative values of other disinfectants of a different chemical nature, nor does it, of course, afford any measure of other chemical attributes and properties possessed by them and not shared by coal-tar preparations.

The next table is interesting as showing the percentage of increase or decrease of co-efficiency with various organisms under varying conditions of time and temperature, using the Rideal-Walker test again as the standard.

TABLE 2

Table showing percentage of increase or decrease of co-efficiency in respect of various organisms, and as resulting from varying conditions of time, temperature, etc., the "Rideal-Walker" test being taken as the standard.

No. of Sample.	R.-W. Co-eff.	Decrease with			Increase with *B. diph.* −1 Broth.	Increase or Decrease when		
		B. coli +15 Broth.	*Staph. p. aureus* −1 Broth.	*Staph. p. aureus* +15 Broth.		Temp.=37° C. *B. typh.*+15 Broth.	Time is extended to 1–1¼ hours *B. typh.*+15 Broth. at normal temp.	Temp.=37° C. and time extended to 1–1¼ hours. *B. typh.*+15 Broth.
EMULSIFIED DISINFECTANTS.								
		%	%	%	%	%	%	%
1 "S.-Ok-ol"	22·0	−16	−17	−47	+27	−14	+ 3	−23
2 . .	18·0	−24	—	−48	+19	− 8	− 4	−28

HOMOGENEOUS DISINFECTANTS, ETC.

1 "S.-Bactox" .	20·0	−19	—	−44	+75	+58	+18	−11
2 . .	19·0	−20	−18	−58	+47	—	—	—
3 . .	18·0	−22	−34	−71	+11	—	—	—
4 . .	17·0	−21	—	−45	—	—	—	—
5 . .	16·0	−26	−25	−53	+50	+32	+18	−15
6 . .	12·0	−17	−24	−56	+11	—	—	—
7 . .	9·5	−12	—	—	—	—	—	—
8 . .	2·5	− 8	−56	−68	+40	—	—	—
9 . .	2·4	−13	—	−46	+79	—	—	—
10 . .	2·3	− 9	—	−13	+100	—	—	—
H_2O_2 9–10 vols. .	0·04	nil	—	—	—	+125	+400	+875
Formaldehyde 37% to 39% .	0·35	−14	—	−46	—	+23	+160	+414
Carbolic acid .	1·0	−10	nil	−20	+80	+80	+70	+220

Increase is indicated by the + sign. Decrease is indicated by the − sign.

It is to be observed, with respect to Table 2, that there is a small falling off in the co-efficient value of the emulsified preparations 1 and 2, with increase in temperature, whilst there is a real increase in the relative co-efficient value of carbolic acid under the varying conditions of the experiments.

A particular point to be noted in connexion with Table 2 is the considerable increase, speaking generally, of the disinfectant value with increase of temperature as regards the coal-tar preparations therein referred to, while it is to be remarked that both peroxide of hydrogen and formaldehyde pick up very largely in disinfectant value under increased temperature, and *intensely* so under increased temperature coupled with increased time of exposure; these last results are significant in contrast with the slight loss of disinfectant value exhibited by the homogeneous preparations under similar conditions.

The following table is useful for showing the dilutions of the several disinfectants therein referred to, which were found necessary to kill various germs under varying conditions, and the results speak for themselves :—

Dilutions of disinfectants required to kill various organisms under varying conditions.

Table 3

		B. typhosus.				*B. coli.*	*Staph.p. aureus.*	*B. diph.*
		Broth + 15.				Broth + 15.	Broth + 15.	Broth − 1.
No. of Sample.	R.-W. Co-eff.	7½ mins. at 15–18 C	1¼ hours at 15–18°C.	1 hour at 37° C.	1¼ hours at 37° C.	7½ mins. at 15–18°C.	7½ mins. at 15–18°C.	7½ mins. at 15–18°C.
Emulsified Disinfectants.								
		1 in	1 in	1 in	1 in	1 in	1 in	1 in
1 "S.-Okol"	22·0	2,000	3,250	4,000	—	1,400	800	4,400
2 . . .	18·0	1,700	2,400	3,500	—	1,300	800	3,500
Homogeneous Disinfectants, etc.								
		1 in	1 in	1 in	1 in	1 in	1 in	1 in
1 "S.-Bactox"	21·0	2,000	5,200	—	—	1,500	950	6,000
2	19·0	1,900	—	—	—	1,200	600	4,000
3	18·0	1,800	—	—	—	1,400	400	2,800
4	17·0	1,700	—	—	—	1,300	850	—
5	16·0	1,500	3,200	—	—	1,000	550	3,650
6	12·0	1,300	—	—	—	1,000	300	2,600
7	9·5	1,000	—	—	—	800	—	—
8	2·5	250	—	—	—	230	65	600
9	2·4	240	—	—	—	200	140	750
10	2·3	250	—	—	—	200	170	1,000
H_2O_2 (9–10 vols.) . .	0·04	6	—	—	—	4·5	—	—
Folmaldehyde (37–39%) .	0·35	33	160	450	550	28·0	18	—
Carbolic Acid (average) .	1·0	100	170	300	320	90·0	80	180

The next tables are valuable as showing how largely the germicidal co-efficiencies of coal-tar disinfectants vary according to the precise nature of the test which is imposed, and the results which are here tabulated show that the relatively high values, as determined by the Rideal-Walker test, become enormously depreciated when the same preparations are subjected to examination by the Martin and Chick (Lister Inst.) tests—3 per cent. dried faeces :—

TABLE 4

EMULSIFIED DISINFECTANTS.

Sample.	Rideal-Walker Test	Martin and Chick (Lister) Test.	
No. 1 " S.-Okol "	20	1·6	—
No. 2 . . .	18	1·5	—

TABLE 5

HOMOGENEOUS DISINFECTANTS.

Sample	Rideal-Walker Test	Martin and Chick (Lister Inst.) Test.	
		As determined in the " Sanitas " Laboratories.	As determined by another experimenter
A	20·0	1·6	3·5
B	17·0	1·6	—
C	10·0	1·3	1·8
*D	5·2	1·3	—
E	4·0	2·0	—

* This preparation was ortho-oxalic acid ester of phenol.

In addition to the observations already made with respect to these tables, Nos. 4 and 5, the figures are remarkable as showing how one preparation with the modest Rideal-Walker co-efficiency of 4 shows a higher value by the Martin and Chick (Lister Inst.) test than other preparations (of the same general class, but varying chemical composition) having a Rideal-Walker co-efficiency of 20 and thereabouts. The figures given in the fourth column show the results of the Lister Institute test, as applied by another experimenter, using a different culture and carried out in another laboratory.

The presence of organic matter in solution in the form of broth (viz., that which is ordinarily employed in making cultures by the Rideal-Walker test), as affecting co-efficient values, was next studied to some extent, the results being shown in the appended table, No. 6 :—

TABLE 6

Sample.	Rideal-Walker Test.	
	Ordinary.	With Organic Matter in Solution.
"S.-Okol"	20	17·7
"S.-Bactox"	20	17·0
Disinfectant 3	12	10·0

Here again there is some depreciation in co-efficient value, but nothing like so serious as is shown in the Martin and Chick (Lister Inst.) tests.

With further reference to this last-named test, as it might be conjectured that the loss of co-efficient value is due to some extent to the mechanical action of the solid matter (faeces) which is used, some simple experiments were made, introducing, in as many experiments, 3 per cent. of kieselguhr, powered pumice and precipitated chalk respectively, into the water used to dilute the disinfectant (of previously ascertained value). In point of fact, "Sanitas-Bactox" of co-efficient 20 was employed, and it was found that the introduction of these solid substances into water so used had no effect whatever upon the co-efficiency of that preparation.

We desire to express our appreciation of the assistance given to us in the conduct of this investigation by Mr. H. F. Bottomley, F.C.S.

A NOTE UPON THE WOODHEAD-PONDER MODIFICATION OF THE RIDEAL-WALKER METHOD FOR TESTING DISINFECTANTS

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Having devoted some time to the consideration of the standardization of disinfectants, and having had, I believe, a somewhat wide experience of the Rideal-Walker process, I read with considerable interest the modification of the method suggested by Professor Woodhead and Dr. Ponder, contained in the Report

of the *Lancet* Commission on the subject,[1] and I propose to offer some criticisms on their work. The essential modifications of the Rideal-Walker method proposed by Woodhead and Ponder are :—

1. The "seeding" of larger amounts in the sub-cultures; this is carried out by employing platinum spoons instead of the ordinary "standard" platinum loop.[2]

2. The use of McConkey medium (litmus, glucose, taurocholate, peptone, water) instead of broth for the sub-cultures.

3. The use of *Bacillus coli* instead of *B. typhosus* as the test organism.

4. The employment of a larger number of dilutions, both of disinfectant and of carbolic acid standard.

5. The prolongation of the time of action to thirty minutes.

6. The calculation of the carbolic co-efficient by taking the mean of the co-efficients obtained at two and a half minutes and at thirty minutes.

These points I propose to take in sequence, and to offer some remarks upon them. First, with regard to the volume of fluid taken up by the spoons; this is stated to be about 0·08 c.c. The spoons are half-spheres of 8 mm. diameter. Now a sphere of 8 mm. diameter has a volume of about 269 c.mm., and the hemisphere will have a volume of 134·5 c.mm. Allowing 25 per cent. for imperfect filling, etc. (surely a liberal allowance), the spoon will therefore take up at least 100 c.mm., or 0·1 c.c., and will carry over more than this. Actual weighings with two such spoons gave the following results: First spoon, 0·158 and 0·155 Gm. of water. Second spoon, 0·168 and 0·167 Gm. of water. The spoons were dipped in distilled water and weighed full, and wet on the outside, as is the condition in actual practice. The loop is stated to contain less than one-third of the volume of the spoon, say 0·02 c.c. Actual weighings of loops gave the following figures: 0·015, 0·013, 0·012, and 0·010 (an old wire) Gm. of water.

The spoon therefore actually carries ten to fifteen times as much as a "standard" loop. As regards the "seeding" of the various carbolic and disinfectant solutions, one spoonful of broth culture is added to 5 c.c. of the solution, an amount, say of 0·03 c.c. of solution. In the Rideal-Walker method one drop of culture is added for each c.c. of disinfectant solution. I use small terminal bulb pipettes of 2 to 3 c.c. capacity for adding the

[1] *Lancet*, 1909, II., pp. 1454, 1515, 1612.
[2] The "standard" loop is a loop 1 mm. internal diameter made with platinum wire of 27 to 28 B.W. Gauge.

culture to the disinfectant solutions. I find that these pipettes deliver about 18 to 22 drops of water per cubic centimetre, and 27 to 32 drops of broth culture per cubic centimetre. It is interesting to note that the drops of broth are thus 50 per cent. smaller than drops of water delivered with the same pipettes. The volume of the drops of broth culture delivered with these pipettes is therefore approximately 0·03 c.c. That is to say, the disinfectant solutions both in the Rideal-Walker test and in the Woodhead-Ponder modification of it are seeded with approximately the same amount of culture.

If it be really of importance to "seed" the sub-cultures with more than a "standard" loopful, as is usually done, and to employ a quantity equivalent to three or four loopfuls, this can be carried out in a manner far simpler and less costly than with platinum spoons. This is to use, instead of one loop, three or four loops on the wire, and as many as six loops can quite conveniently be used. Weighings of the amount carried by these multiple loop wires gave the following results :—

For four loops	.... 0·058 and 0·059	Gm.	of water.
,, ,,	.... 0·066	,,	,,
,, ,,	.... 0·054	,,	,,

From these data and from actual use in practice, it is found that multiple loop wires will serve every purpose if it be admitted that it is necessary to seed more than one standard loop (which I think is very questionable) and provided that there is no need to seed more than three to six loops. This does away with the need of the apparatus for sterilizing the spoons if the time intervals of thirty seconds, as used ordinarily in the Rideal-Walker test, are adhered to, the loop cooling completely in the interval, or if the time intervals be shortened, a couple of wires suffice, the two being used alternately; the wires heat and cool much more rapidly than the spoons do, and much time is thus saved. The vital question is, however, does the "seeding" of a larger amount really make any difference ? Using the carbolic acid at about the strength that would be employed in a Rideal-Walker test, I find, using *broth* for the sub-cultures, that there is little difference between a loop and a spoon as regards the duration of vitality of the organism as gauged by growth in the sub-cultures. With somewhat weaker strengths, the spoon gives growth for a longer period than a standard loop, but as presumably this would be the same both for the disinfectant and for the

carbolic controls it would make little or no difference in the final results. I see therefore no advantage in using the spoon; if there be any need to sub-culture more than a loopful it would equally be gained by using three or four loops on one wire instead of the ordinary single one. The following table (I) shows comparative results obtained with the use of a standard loop and of the spoon, using broth as a medium for the sub-cultures :—

TABLE I

B. typhosus, twenty-four hours' Broth Culture at 37°C.
Temperature 19° to 20°C.

Number and Date.	Implement	Phenol Dilution.	Time culture exposed to action of disinfectant—minutes. 2½	5	7½	10	12½	15	Sub-cultures. Period of Incubation	Temperature.
105	Standard loop	1 115	+	+	—	—	—	—	3 days	37°C.
July 6,	Four loops .	1–115	+	+	+		—	—	(Broth)	—
1910	Standard loop	1–110	+	+	—	—			—	
	Four loops .	1–110	+	+	—	—		—	—	—
106	Standard loop	1–115	+	+	+	—	—		3 days	37°C.
July 7,	Spoon . .	1–115	+	+	+	+	—	—	(Broth)	—
1910	Standard loop	1 110	+	+	—	—	—		—	—
	Spoon . .	1 110	+	+	—	—	—	—	—	—

B. coli, twenty-four hours' Broth culture at 37°C.
Temperature 19° to 20°C.

114	Standard loop	1–80	+	+	+	—	—	—	4 days	37°C.
July	Spoon . .	1–80	+	+	+	+	+	+	(Broth)	—
14,	Standard loop	1–70	+	+	—	—	—		—	—
1910	Spoon . .	1–70	+	+	—	—	—	—	—	—

Next we come to the use of the McConkey medium in place of broth for the sub-cultures. I have done several comparative experiments, using broth and McConkey medium, and I am convinced that the latter is a far less delicate medium for the detection of growth in the sub-cultures than broth is. The following table (II) shows this :—

Table II

B. coli, twenty-four hours' Broth Culture at 37°C.
Temperature, 19° to 20°C.

Number and Date.	Culture Medium used for the Sub-Cultures.	Phenol Dilution.	Time culture exposed to action of disinfectant—minutes.						Sub-Cultures.	
			2½	5	7½	10	12½	15	Period of Incubation.	Temperature.
110	Broth . .	1–90		+	+	+	+	—	3 days (A standard loop used for sub-culturing)	37°C.
July 8,	Bile Salt, P.W.	1–90		+	+	+	—	—		—
1910	Broth . .	1–80		+	+	+	—	—		—
	Bile Salt, P.W.	1–80		—	—	—	—	—		—
111	Broth . .	1–80	+	+	+	—	—	—	3 days (A standard loop used for sub-culturing)	37°C.
July	Bile Salt, P.W.	1–80	+	—	—	—	—	—		—
11,	Broth . .	1–70	+	—	—	—	—	—		—
1910	Bile Salt, P.W.	1–70	—	—	—	—	—	—		—
112	Broth . .	1 80	+	+	+	—	—	—	3 days (A 4-loop needle used for sub-culturing)	37°C.
July	Bile Salt, P.W.	1–80	+	—	—	—	—	—		—
12,	Broth . .	1–70	+	—	—	—	—	—		—
1910	Bile Salt, P.W.	1–70	—	—	—	—	—	—		—
113	Broth . .	1–80	+	+	+	+	+	—	4 days (A Woodhead spoon used for sub-culturing).	37°C.
July	Bile Salt, P.W.	1–80	+	—	—	—	—	—		—
14,	Broth . .	1–70	+	—	—	—	—	—		—
1910	Bile Salt, P.W.	1–70	—	—	—	—	—	—		—
126	Broth, loop .	1–80	+	+	+	—	—	—	3 days	37°C.
July	Broth, spoon	1–80	+	+	+	+	+	—	—	—
21,	Bile P.W., loop	1–80	+	—	—	—	—	—	—	—
1910	Bile P.W., spoon . .	1–80	+	—	—	—	—	—	—	—

(+For the Bile Salt P.W. = Acid + Gas.)

3. As regards the use of *B. coli* in place of *B. typhosus* in carrying out the test, I think it is probably a desirable change to make, provided different strains of *B. coli* do not differ too much in resistance; even if there be considerable differences in resistance, it may well be that the resistance will equally affect the disin-

fectant and the carbolic controls, so that the co-efficient obtained would still be the same, but only extended work can settle this point. I have tested the action of carbolic on five different strains of *B. coli*: (1) An old laboratory strain, (2) another laboratory strain isolated twelve months previously from faeces, (3), (4), and (5) strains just isolated from faeces. There is a slight variation between them, but it does not amount to a difference in strength of the carbolic of more than 1 in 70 and 1 in 80. (Table

TABLE III

B. coli, twenty-four hours' Broth Culture at 37°C.
Temperature 19° to 21°C.

Number and Date.	Strains of *B. coli* used.	Phenol Dilution.	Time culture exposed to action of disinfectants—minutes.						Sub-Cultures.	
			2½	5	7½	10	12½	15	Period of Incubation.	Temperature.
115 *July* 15, 1910	A_2 (fresh from faeces)	1–80	+	—	—	—	—	—	3 days (A standard loop used for sub-culturing)	37°C.
	Ditto	1–70	+	—	—	—	—	—		—
	B_1 (fresh from faeces)	1–80	+	+	+	+	—	—		—
	Ditto	1–70	+	+	—	—	—	—		—
119 *July* 18, 1910	A_2 (fresh from faeces)	1–80	+	+	+	—	—	—	3 days (A standard loop used for sub-culturing)	37°C.
	Ditto	1–70	+	+	—	—	—	—		—
	B_1 (fresh from faeces)	1–80	+	+	—	—	—	—		—
	Ditto	1–70	+	—	—	—	—	—		—
	Ordinary Laboratory	1–80	+	+	+	—	—	—		—
117 *July* 16, 1910	W. (fresh from faeces)	1–80	+	—	—	—	—	—	3 days (A standard loop used for sub-culturing)	37°C.
	Ditto	1–70	+	—	—	—	—	—		—
	Old Lab. (from faeces)	1–80	+	+	+	—	—	—		—
	Ditto	1–70	+	—	—	—	—	—		—
120 *July* 18, 1910	W. (fresh from faeces)	1–80	+	—	—	—	—	—	3 days (A standard loop used for sub-culturing)	37°C.
	Ditto	1–70	+	—	—	—	—	—		—
	Old Lab. (from faeces)	1–80	+	+	+	—	—	—		—
	Ditto	1–70	+	+	+	—	—	—		—

III.) Another point of some, but perhaps of minor, importance is whether co-efficients obtained with *B. coli* and *B. typhosus* will be comparable. I have not had time to go into this question, but with one sample of a disinfectant the co-efficient of which for *B. typhosus* is about 19–20, the co-efficient for *B. coli* comes out also at 19–20. In other cases the co-efficient has been lowered two or three points by the use of *B. coli* in place of *B. typhosus*.

4. The employment of a large number of dilutions both of disinfectant and of carbolic control undoubtedly conduces to obtaining a result more quickly, but it really comes very much to the same thing as doing three or four Rideal-Walkers, though, it is true, time is saved by the Woodhead-Ponder method. I note that Woodhead and Ponder employ seventeen to twenty dilutions of disinfectant and carbolic for one test, which is equivalent to doing three to four Rideal-Walkers.

There is no reason why the Rideal-Walker method should not be somewhat modified so as to include a larger number of dilutions. For this purpose the Rideal-Walker test-tube rack may be modified so as to take seven (or even eight) dilutions. With six tubes, two dilutions of carbolic may be included instead of one, with four dilutions of disinfectant, as at present, the time intervals being twenty-five instead of thirty seconds; with seven tubes, similarly, two dilutions of carbolic and five of disinfectant may be used, the time intervals being twenty seconds, with twenty-five seconds interval at the end of the seeding and of each series of sub-cultures. These time intervals are perfectly practicable to work with. By this means I believe all the modification desirable for convenience may be obtained while still adhering practically to the Rideal-Walker technique.

5. The question of extending the time limit from fifteen minutes to thirty minutes is a difficult one to decide. I believe it is unnecessary for all the ordinary "coal-tar" disinfectants, but may be desirable in the case of mercuric chloride and similar slowly acting disinfectants. I am inclined to suggest a compromise, viz., to extend the time limit to twenty minutes, and to do this by the Rideal-Walker technique by the inclusion of a seventh series of sub-cultures, the time interval between the sixth and seventh series of sub-cultures being made five instead of two and a half minutes, though, of course, there is no reason why eight series of sub-cultures should not be made, keeping the time intervals two and a half minutes throughout. This is provided for in the modified Rideal-Walker rack, which I show.

Incidentally the temperature at which the test should be conducted may here be discussed. I believe it is better, and it is certainly simpler, to conduct the test always at some particular temperature, rather than to vary the strengths of the carbolic controls, according to the room temperature. For some time I have adopted Martin and Chick's suggestion of working at 20° C., but as it is only for about three months in the year that this temperature is attained in this country, I think that perhaps a temperature of, say, 18°C. (64·4°F.) is more in accordance with the actual conditions of practical disinfection.

6. With regard to Woodhead and Ponder's method of calculating the co-efficient, which is to take the mean of the co-efficients at two and a half minutes and at thirty-minutes, in almost every case the co-efficient at thirty minutes is higher than that at two and a half minutes, in some instances by as much as 100 per cent. Therefore the mean co-efficient obtained is always greater than the co-efficient obtained at the earlier times. From the point of view of the manufacturers, who are but human beings, this is doubtless a gratifying result, but from the point of view of those who wish to retain a large " factor of safety " in the use of disinfectants, this is surely an undesirable result, and it establishes the fact that the Rideal-Walker method is a *stringent* test.

I also note that the strength of carbolic required to kill *B. coli* in two and a half to five minutes employed by Woodhead and Ponder is generally about 1·0–1·1 per cent. By the Rideal-Walker method I find the strength of carbolic required to kill *B. coli* in this time is 1·4–1·6 per cent., a difference of 30–40 per cent. I attribute this difference to the greater delicacy of broth, compared with the McConkey fluid, as a medium for the sub-cultures. If this acts equally as regards disinfectant and carbolic control, it will, of course, make no difference in the final result, but it is a point worth bearing in mind.

I am astonished to see that Woodhead and Ponder state that they have never met with a (coal-tar) disinfectant having a co-efficient above 13·5. Presumably this result is obtained with *B. coli*, and this fact ought to have been made quite clear. I believe the use of *B. coli* does in general lower the co-efficient by three to five points compared with the co-efficient obtained with *B. typhosus*. As the statement stands, it suggests that every one has been mistaken in the co-efficients obtained by the Rideal-Walker method.

I do not know why Woodhead and Ponder used as a broth

culture medium bullock's heart broth. I find, however, that it is a good culture medium; in fact, a much more "delicate" culture medium than "Lemco" broth for detecting growth in the sub-cultures.

TABLE IV

("Lemco" Broth used for the sub-cultures).—*B. coli*, twenty-four hours' Broth Culture at 37°C. Temperature, 19° to 20°C.

No. 123, date July 20, 1910.

Sample.	Dilution.	Time culture exposed to action of disinfectant—minutes.						Sub-Cultures.	
		2½	5	7½	10	12½	15	Period of Incubation.	Temperature.
Phenol . . .	1-80	+	—		—	—	—	3 days	37°C.
Disinfect. U. .	1-1800	+	+	+	—	—	—	(A standard	—
Ditto . .	1-1600	+	—	—	—	—	—	loop used for	—
Ditto . .	1-1400	+	—	—	—	—	—	sub-cul-	—
Ditto . .	1-1200	—	—	—	—	—	—	turing)	—

(Culture made in "Lemco" Broth.)

Therefore carbolic acid co-efficient $-\frac{1600}{80}=20{\cdot}0$.

TABLE V

(Bullock's Heart Broth used for the Sub-Cultures).—*B. coli*, twenty-four hours' Broth Culture at 37°C. Temperature 19° to 20°C.

No. 124, date July 20, 1910.

Sample.	Dilution.	Time culture exposed to action of disinfectant—minutes.						Sub-Cultures.	
		2½	5	7½	10	12½	15	Period of Incubation.	Temperature.
Phenol . . .	1-80	+	+	+	—	—	—	3 days	37°C.
Disinfect. U. .	1-1800	+	+	+	+	+	+	(A standard	—
Ditto . .	1-1600	+	+	+	—	—	—	loop used for	—
Ditto . .	1-1400	+	—	—	—	—	—	sub-cul-	—
Ditto . .	1-1200	+	—	—	—	—	—	turing)	—

(Culture made in "Lemco" Broth.

Therefore carbolic acid co-efficient $\frac{1600}{80}=20{\cdot}0$.

TABLE VI

B. coli, twenty-four hours' Broth Culture at 37°C.
Temperature 19° to 20°C.

No. 125, date July 20, 1910.

Culture Medium used for the Sub-Cultures.	Phenol Dilution.	Time culture exposed to action of disinfectant—minutes.						Sub-Cultures.	
		2½	5	7½	10	12½	15	Period of Incubation.	Temperature.
Bullock Broth .	1–80	+	+	+	+	—	—	3 days	37°C.
Ditto . .	1–70	+	+	—	—	—	—	(A standard	—
"Lemco" Broth	1–80	—	—	—	—	—	—	loop used for	—
Ditto . .	1–70	—	—	—	—	—	—	sub-culturing)	—

Heart muscle is, of course, a peculiar tissue in that it contains a large amount (8 per cent. of the moist muscle) of lipoid substances, one of which is a peculiar phosphatite "Cuorine."

DISCUSSION

The discussions on these papers were taken together.

Dr. RIDEAL, who spoke as the joint author of the Rideal-Walker test, pointed out that of the two methods for the valuation of disinfectants, the chemical and the bacterial, the latter during the last five years had been most extensively used, owing to the general adoption of the technique and conditions suggested by himself and Mr. Ainslie Walker at the Sanitary Institute Congress in July, 1903. In that paper they defined certain conditions of testing which they themselves had found convenient, and which, if they became conventional, would obviate confusion in the future. The *Lancet*, however, in November, 1909, suggested a modification of the Rideal-Walker co-efficient process, and also attempted to show that a chemical method of examination, based on the amount of phenoloids and their bromine absorption, in the case of coal-tar emulsions, gives "a decided clue to germicidal power." On December 18, 1909, he drew attention to some of the difficulties which the *Lancet* method of testing introduced into the subject, and the Commissioners replied to his objections in the same issue, and since

that date he had had the opportunity of discussing the matter with Professor Sims Woodhead and Dr. Ponder, and doing further work on the subject. On May 7, 1910, the *Lancet* again gave the exact details of the chemical analysis of coal-tar disinfectants as employed in their laboratory, and they had to-day an opportunity of further discussing the subject. He wished first to refer to the chemical method. It had always been difficult to complete the extraction of the phenoloids from an emulsion in which a soap was used, and when mixed with neutral hydrocarbons. The *Lancet* process converted the phenoloids into a sticky mass of baryta salts, which it is difficult to wash and to free from the less soluble baryta compounds. The difficulties of estimating accurately a mixture of more or less deliquescent volatile tar acids by drying and weighing were not overcome in this process, and, as only a small quantity of phenoloids are dealt with in the ethereal extract, the error involved in attempting to completely dry without loss of volatile tar acids might be considerable. In the process as described in November, 1909, evaporation at 100° F. was the only detail mentioned, and he found that an error of 4 or 5 per cent. in the percentage of phenoloids could occur by varying the amount of air drawn through in this process. The Commissioners therefore modified the process in reply to that criticism, and on December 18, suggested that the last portion of the ether should be allowed to evaporate over anhydrous calcium chloride. Even this refinement had not at his hands given concordant or definite results ; for while the water was evaporating some volatile tar acid escaped, and there could be no sharp line of demarcation between the volatilization of the water and that of the tar acids. To take one case, a disinfectant gave 41·59 per cent. of phenols on a Saturday after all the water had apparently disappeared, but it was then returned to the desiccator and kept over calcium chloride for the week-end, and weighed on the Monday and found to be only equal to 33·49 per cent., the actual weighings being 0·8318 Gm., falling to 0·6699. The desiccator on the Monday showed on its sides an oily film smelling of tar acids. It was clear that the conventional use of a fixed time of a quarter of an hour that was introduced into the process by the *Lancet* on May 7 did not give a scientific or correct result. There was no difficulty in determining the bromine absorption of the phenoloids, but it was assumed by the *Lancet* that the formula (P–B)/3 represented the germicidal value. There was no reason for that, and it was

obvious that if the tar acid used was carbolic acid P=B, one got the startling result of an emulsion made from carbolic acid having no germicidal value, since (P–B)/3 would represent zero. It also followed that the addition of any amount of carbolic acid to a coal tar disinfectant would not alter its germicidal value when so determined. In fact, the formula (P–B)/3 did not even give a measure of the higher phenols, and also wrongly assumed that the higher the molecular weight the higher the germicidal action. Nothing definite was known as to the relation between bromine absorption and germicidal value, and until phenoloids of known constitution had been examined a few chance agreements could not warrant a generalization of that character. With Cyllin disinfectant, which he purchased in the open market, and two other disinfectants that Mr. Ainslie Walker had prepared, both made with 40 per cent. phenoloids and showing about 21 per cent. bromine absorption, he obtained the following results :—

	Rideal-Walker Carbolic Acid Co-efficient.	P.	B.	$\frac{P-B}{3}$	*Lancet* Bacterial Test.
Cyllin (1)	19·5 W	—	—	—	—
„ (2)	19·0 R	41·9	19·6	7·4	5·2
Disinfectant 15 (1) . . .	15·0 W	—	—	—	—
„ (2) . . .	15·5 R	40·3	21·8	6·2	5·5
Disinfectant 25 (1) . . .	25·26 W	—	—	—	—
„ (2) . . .	26·5 R	39·2	21·6	5·9	6·5

The Commissioners were agreed that the Rideal-Walker test, if properly carried out, was accurate. But he contended that these results showed decisively that the phenoloids and the bromine absorption did not, as claimed by the Commissioners, determine the germicidal activity of disinfectant emulsions. Referring next to the bacteriological section, Dr. Rideal said :— The first criticisms of the *Lancet* method, not referring to any particular disinfectant, are that it is cumbrous and elaborate, requiring special apparatus to work it, a large number of tubes, and other objections to the technique. On page 1612 the *Lancet* Commissioners say that the figures calculated from (P–B)/3 agree, " with few exceptions " (and again, " in the majority of cases "), with the carbolic acid co-efficient they find by their " modified " method with *B. coli.* But the table they give on the

same page shows eight exceptions out of seventeen experiments, so that there are about an equal number of cases where the figures agree as when they diverge widely, sometimes to the extent of 50 per cent., according to their own finding—and there is no chance of improving matters by amending the divisor 3, as the discrepancies sometimes gives a higher and sometimes a lower ratio. What can we think of a proposed formula which gives a calculated result occasionally agreeing with the experimental figure, in other cases double the latter, and which gives the carbolic acid itself a germicidal value of $(100-100)/3=0$! It may also be incidentally observed that tribrominated phenoloids, which under the circumstances have no bromine absorption, would have a calculated germicidal value of $(100 \cdot 0)/3 = 33 \cdot 3$! The Commissioners themselves suggest a general doubt in the remark, "assuming that there is any value in the calculation at all." I have found that the wheel and spoons are difficult to work at first, and are by no means so easy to use for inoculating the sub-cultures as the platinum wire loops, but after the practice required in a couple of tests, one can carry through a complete test without accident. The specimen pots which contain the dilutions and culture broth are left unplugged throughout the test. On some of my charts, and also on some published in the *Lancet*, there is a "no growth" sign, followed by "growth" later on. In my case these accidents have occurred in tests that seemed most carefully carried out, and the only explanation of the contamination appears to be the open pots. On this ground the R.-W. test is preferable. The dilutions and the broth tubes for sub-cultures are all plugged, and the cotton-wool plug is only removed while a loopful of the disinfectant dilution and culture is being transferred to the broth sub-culture. The time allowed in the *Lancet* method to inoculate the disinfectant dilutions, and later to inoculate the sub-cultures from the dilutions, is not sufficient for a thorough mixing. In the R.-W. test the disinfectant dilutions are shaken before a loopful is taken out, not merely occasionally stirred. This is impossible in the *Lancet* method, because of the short open pots employed, even if sufficient time were available. The statement of the Commissioners that each chart carries its own credentials is, of course, true of the original R.-W. chart, the importance and value of which the authors have always insisted upon. The chart produced by the *Lancet* test is acknowledged by the Commissioners not to be necessary to the test, as the two and a half

and thirty minute lines alone are required, but only to serve as a "line of demarcation"—that is, as a control. But whatever the "line of demarcation" may indicate, it is of no use if either the two and a-half or thirty minute lines of the tests show irregularities. The objection to the large number of test-tubes and materials used is felt more in some laboratories than others. Where there is a large amount of mixed work the holding up of over 70, or sometimes 100, tubes is often a great nuisance. The feeling running through the bacterial section of the Commissioners' reply seems to be that the R.-W. test is so difficult that only an expert can obtain consistent results, but that the *Lancet* test is so much easier that it can be used by an average chemist or medical officer of health who is unable to carry through the R.-W. test. One would think that a man inexperienced in bacteriological testing would prefer a test lasting fifteen minutes which required one platinum loop, four dilutions of the disinfectant and one of the carbolic acid, and thirty tubes to inoculate at the rate of one every thirty seconds, in place of a test that needs an apparatus requiring some practice to use, nine or ten dilutions of disinfectant and four or five of carbolic acid, and over seventy tubes to be inoculated, one every twelve and a-half seconds, and the test taking thirty minutes to finish! And in my opinion, apart from questions of accuracy, between the spoons and the loops, etc., the *Lancet* test is more formidable, and requires at least as much skill as the R.-W. process, in spite of the use of the automatic sterilizing apparatus. The *Lancet* Commissioners have investigated the R.-W. test, and did not obtain satisfactory results; the carbolic acid co-efficients that they did obtain were much lower than those obtained by other chemists and bacteriologists, or claimed by the manufacturers. So they suggest that advantage has been taken of loopholes in the R.-W. method, and that the manufacturer often has results spread over a wide range, and then picks out the most convenient co-efficient. This seems unjust, in view of the fact that some leading manufacturers have published the whole of the R.-W. co-efficients obtained by different bacteriologists with their disinfectants for a variety of organisms. They proceed to discuss the reasons why all other chemists and bacteriologists differ from them in the R.-W. test results, and specify a number of ways in which the test in their opinion is at fault. These are:—(1) No definite organism being prescribed; (2) old carbolic acid controls being used; (3) the effect of temperature being

ignored; (4) the co-efficients being deduced from insufficient data, whereby biassed observers may obtain results far from the truth, but convenient. I can only say in reply to such criticisms, that if any of these errors are committed, the test is not conducted according to the Rideal-Walker method. One important point, the composition of the broth, has escaped the Commissioners' investigation, or they would not have proposed bullock's heart to be employed. No mention is made as to whether the bullock be young or old, under or overfed, or whether the heart be fresh or chilled; yet every one of these factors influences the growth of bacteria in the broth. I explain the failure of the Commissioners to obtain satisfactory results with the R.-W. test, by supposing that they used bullock's heart broth in place of the Lemco recommended by Mr. Ainslie Walker and myself. I have found the change in the carbolic acid co-efficient caused by using bullock's heart broth instead of Lemco broth, both for the culture medium and sub-cultures. If therefore the Commissioners used bullock's heart broth instead of the Lemco broth prescribed, their failure with the R.-W. test is readily explained. That the R.-W. test does not agree with the *Lancet* test may be due to three reasons :—(1) The culture medium; Lemco broth does not give so resistant a culture to disinfectants as bullock's heart broth does, although in both cases the resistance of the bacteria to phenol is nearly the same. As we have seen, the use of bullock's heart broth lowers the co-efficient almost one-half. (2) The test organism: The R.-W. test is done with *B. typhosus* and the *Lancet* test with *B. coli*. *B. coli* has been found to be about 10 per cent. more resistant than *B. typhosus* in the R.-W. test. (3) The use of spoons in place of loops: The five drops of culture added to a dilution in the R.-W. test is approximately 0·10 c.c. The *Lancet* spoons transfer, on an average, 0·10 to 0·15 c.c. But in the inoculation of the sub-cultures the loop carries 0·004 c.c., and the spoon, as before, 0·10 to 0·15 c.c. The increased quantity of liquid carried by the spoon does not determine the lethal point of the bacteria, because less mixing of the culture and disinfectant is possible in the *Lancet* process. So, although, in theory, the spoon ought to give a fairer sample than the loop, in practice it does not, as we often find irregularities when the spoon is used. This carrying over of disinfectant into sub-culture has always been a source of criticism in all bacterial tests, and although the R.-W. test has reduced the amount of disinfectant to a minimum by using a fine loop, this

point has been raised against it on the Continent. In the *Lancet* method a still larger dose of disinfectant is carried over to the sub-culture. I may conclude by saying that the only point raised by the Commissioners worth noticing is that which deals with the wide range provided by the R.-W. test. They expressly state that the R.-W. test is accurate if properly carried out. Is it not better to use this test, which sorts out the disinfectants from 0 to 25 when working with the same organism, than to use another test in which the same disinfectants are placed between 5 and 8 ?

Dr. David Sommerville said that the *Lancet* method furnishes lower co-efficients than the R.-W. method ; so also does the Lister Institute method ; but none of these methods furnishes any information concerning types and quantities of disinfectants required for efficient disinfection in practice.—It is idle to state that any method of standardization assists in this direction. It is true that in recent years R.-W. co-efficients have been freely advertised several points higher than can be obtained by a proper use of the test. This fact should not, however, be used to discredit the test—rather those who wrongly use it. So long as the conditions of the R.-W. test are fulfilled it yields uniform results ; and the harmonious curves insisted on by Walker and myself in 1906, and seen in the three tables selected at random from a series of 130 tests performed in the last two years, are always produced.

No. 47.—October 9, 1909.

	1 : 800	×						*B. typhosus.*
	1 : 900	×	×					72 hrs.
	1 : 1,000	×	×	×				37° C.
	1 : 1,100	×	×	×				
Phenol .	1 : 110	×	×	×				

$$\frac{1000}{110}=9.$$

No. 50.—November 4, 1909.

	1 : 1,600	×						*B. typhosus*
	1 : 1,650	×	×					72 hrs.
	1 : 1,700	×	×	×				37°C.
	1 : 1,750	×	×	×	×			
Phenol . .	1 : 110	×	×	×				

$$\frac{1700}{110}=15\cdot4.$$

No. 56.—December 21, 1909.

	1 : 1,200	×	×				*B. typhosus* 72 hrs. 37°C.
	1 : 1,300	×	×	×	×		
	1 : 1,400	×	×	×	×	×	
	1 : 1,500	×	×	×	×	×	
Phenol .	1 : 100	×	×	×	×		

$$\frac{1300}{100}=13.$$

It appears necessary again to state that in order to obtain uniform results the conditions (including the composition of the broth used) must be scrupulously fulfilled. It has recently been stated that when in the R.-W. method broth made from bullock's heart (*Lancet* formula) is substituted for broth made from Lemco, the co-efficient drops considerably. With a view to discovering, if possible, something of the meaning of the alleged drop in co-efficients, I made a careful determination of the total N, P_2O_5, creatin, and creatinin in each broth. These are :

	Per cent.			
	Total N	P_2O_5	Creatin	Creatinin
Lancet broth . .	0·194	0·082	0·120	0·040
Lemco broth . .	0·428	0·092	0·170	0·080

Lemco broth is considerably richer in total N, and in creatin and creatinin, and slightly richer in P_2O_5. It should be noted that the composition of McConkey's medium is totally different from both. It will be interesting later to learn what effect an increase or decrease of any of these constituents in the primary broth, secondary broth, or (in the case of the *Lancet* method) in McConkey's medium, has on the co-efficient, and whether such effect is produced through the phenol, or through the disinfectant under test, or through both.

The chemical examination put forward by the *Lancet* is of importance and to be welcomed. But in the case of disinfectants formed from phenoloids emulsionized by resin soaps or fat acid soaps (which class forms the bulk of the better class disinfectants advertised) it is not necessary to adopt the lengthy process detailed in the *Lancet* reports. The percentage composition can be roughly and rapidly determined thus : Fractionally distil, say 100 Gm. Measure water and weigh phenoloids. Below 270°C. resin gives no trouble, as any resin spirit present (never more than 5 per cent. in resin soaps) is in union with alkali, and resin

oils boil between 300° and 400° C. Should a small quantity of neutral oil come over, which very rarely happens, it may be separated from the phenoloids by washing with soda and subsequently splitting off the phenoloids with H_2SO_4.

Five Gm. of the disinfectant are incinerated, resulting in Na_2CO_3 or K_2CO_3. The residue is lixiviated with water, filtered, titrated with standard HCl, and calculated as Na_2O or K_2O ; the weight of the chloride will at once determine whether one is dealing with K or Na.

As the residue in the distillation retort consists of anhydrides of fatty acids, or resin acids, or both, of the form

$$\mathrm{R{\cdot}CO}\,\mathrm{ONa} + \mathrm{Na}\,\mathrm{OOCR}$$

it is plain that in the original disinfectant these anhydrides *plus* H_2O are equivalent to the Na_2O. Hence 5 Gm. disinfectant *minus* weight of Na_2O *equals* fatty acids *plus* resin in 5 Gm.

This rough and ready method will give the water and alkali fairly exact, and the phenoloids within 2 per cent. of error. It can be completed leisurely by a skilled worker within an hour ; and it avoids those experimental errors attaching to hydrolysis and multiple filtrations. If the fatty acid and resin figures are required separately, they can be easily worked out from the retort residue by the method of Twitchell.

Mr. ERNEST FEILMANN remarked that the gravimetric determination of the total phenolic bodies was a weak point in the "L.A.B." method ; to determine their percentage by the method given, or indeed by any known available method, to two decimal places, as given in the tables in the recent *Lancet* articles on this subject, must surely be recognized as impossible by anybody accustomed to this class of work, and in his opinion, an accuracy of one-half of a per cent. was about as much as could be expected with ordinary precautions by any method. It was more accurate to determine the volume, specific gravity, and water contents of the isolated phenolic bodies, from which data their dry weight and percentage are readily calculated. For this purpose it was better to take at least 25 Gm. of the sample instead of 10 Gm. as recommended by the *Lancet* Commissioners. The baryta solution of the phenols, however obtained, was for this purpose acidified slightly with hydrochloric acid, and the separated phenols poured into a burette graduated to 0·1 c.c. Any residual

phenols were rinsed out of the separating funnel with a little ether, which was then used to extract the acidified barium solution. This ethereal solution was in turn extracted with a few cubic centimetres of fairly strong caustic soda solution. This alkaline extract was also acidified with a few drops of hydrochloric acid after the ether had been driven off on the water-bath, and the liquid was then added to the phenols in the burette after adding a little common salt. When the phenols had completely separated, their volume was read off. Their specific gravity was taken in a small pyknometer—a very high degree of accuracy being useless, and therefore unnecessary—and the percentage of water was determined by distilling a known volume from a small distilling flask connected with a short condenser into a small graduated vessel, stopping the distillation when pure phenol commences to distil, and measuring the water, which comes over first. By proceeding in this manner, with ordinary care the personal error is much smaller than by evaporating the ethereal extract and weighing, and it is not very much more trouble. It was difficult to see in what way the method of separating phenols, neutral oils, and organic acids described in the paper referred to was an improvement on the very similar method, differing only in details, described by Ditz and Clauser twelve years ago. He did not propose to say much in reference to the (P–B)/3 figure, as that had been effectively done by others, but what the authors mean by the passage on p. 1613, starting: "It would be of interest to know what it is that bromine displaces, etc.," it was difficult to understand. It was perfectly well known that in the Koppeschaur test the bromine replaces certain hydrogen atoms attached to the benzene nucleus, and no others, three hydrogen atoms in the case of phenol and the cresols, and possibly fewer in the case of some of their higher homologues. He thought it was also obvious, from the very manner of their isolation, that all the bodies classed by the authors and others as "phenoloids" contain a hydroxyl group. The so-called "phenoloids," or "tar-acids," were in no sense mysterious compounds—they simply consisted of phenol and its higher homologues, and the term "phenoloid" appeared to be unfortunate and misleading—"phenolic bodies," or simply "phenols," was a far better term.

Mr. J. E. Purvis said he was very sorry that Mr. Vesey was not present that morning in order to reply in a better manner than he could to the somewhat strenuous criticism which had

been made in regard to the chemical side of these papers, especially as the question in which he, as a chemist, was particularly interested was the chemical aspect. He thought that Dr. Rideal's remarks required some reply from him, and this he would endeavour to do. There was a certain amount of cynical criticism of an empirical formula. Of course, in such a formula as (P–B)/3 there could be no mathematical accuracy except up to a certain point. This formula was designed to correlate the two equivalents—the bacteriological and chemical. That was all that was claimed for it. It was not put forward as a final or absolute figure, it was purely tentative. He thought that would be apparent to any one who read the report a little more carefully and with a little less bias. The point to remember was that, taking the numbers for P and B, by the use of the formula the number obtained had a correlative comparison with the numbers obtained from the bacteriological tests. In all such empirical formulae their aim was to sum up a series of facts, and that formula appeared to sum up the facts of the analyses in the directions indicated. Dr. Rideal had said that Professor Sims Woodhead and Dr. Ponder in their paper brought no further accuracy into the method which Rideal and Walker had suggested seven years ago. He did not think that that was the point at issue; they were discussing now the relative value of different experiments and experimenters. The question should be considered from the point of view of the purchaser—the man who went into the shop for a certain disinfectant and saw a number upon the bottle, and upon that number made his purchase. Then perhaps he went into another shop, and got another disinfectant with a lower number on the bottle. The tendency would be to always purchase the disinfectant with the higher number. What was the result? Dr. Rideal had one number and Professor Woodhead had another. Who should decide whether the purchaser should believe Dr. Rideal or Professor Woodhead. The latter had very properly said in his paper that he had no axe to grind, and that he was not specially interested in any particular industry, and held no shares in any particular company. But Professor Woodhead desired to show that the Rideal-Walker test was a test which could not claim absolute values, and the fact that different experimenters obtained different co-efficients proved the point at issue. Dr. Rideal knew very well that this was true, and the final judge of the relative numbers was not this man or that, but the public.

who bought the disinfectants. The point of interest to the general community was that they might not get the proper article. Dr. Sommerville considered the method of analysis was as deficient not only in that it was long-winded, but also that it did not give the accurate results which were claimed for it. He proposed another method, which was the distillation method. He (the speaker) had tried the distillation method and had found it an absolute failure, because the closeness of the boiling-points interfered with a complete separation, for it was a well-known physical principle that at no particular temperature did a compound come over when mixed with others, but that many distillations had to be repeated before there was a good separation. He went on to say that there could be no hard and fast rule. In conclusion, he pointed out that the main object of the *Lancet* Commission was to show that there was no *absolute* standard for disinfectants, and if a fictitious number were given, the public might be paying for something which was not there.

Mr. J. F. TOCHER said that he considered the method of Professor Sims Woodhead and Dr. Ponder a distinct improvement on the Rideal-Walker method, for many reasons. He had no time to discuss the details of the method, but he would offer a suggestion to the authors of the paper bearing on the interpretation of the results. It should be noted that the authors take the extreme co-efficients, and, striking the mean, give that as the measure of the bactericidal power of the disinfectant compared with that of phenol. This method is not statistically sound. The accurate method of interpreting the results shown on the table would be to evaluate the coefficients for each dilution for each time period, and to calculate the mean value of the co-efficients so found. The figure obtained would give the true bactericidal measure of the disinfectant compared with phenol under the conditions of the experiment.

Mr. H. FINNEMORE said that with regard to the results obtained by fractional distillation a method of analysis by this process had been devised by Young, which gave good approximate results, and although he had not tried it with these homologous phenols, no doubt it would be equally applicable.

Mr. KINGZETT asked permission to add a word to the discussion. As a scientific chemist who had demonstrated the inaccuracy of the *Lancet* chemical method, he protested against the *Lancet's* continued use of its chemical results to confirm the accuracy of its bacteriological results. He also complained

that the *Lancet* had not extended to him the hospitality of its own columns to reply to the Commissioners' statements.

Professor Sims Woodhead's Reply

Professor Sims Woodhead, replying to what he termed "the somewhat discursive discussion," thought that Dr. Rideal had brought forward several points which would have to be met in the spirit in which they had been put before them. Of course it was true that it was a very easy matter to raise the question of spoons; it diverted attention from the question at issue. Largeness of heart was one thing and largeness of mind another, and perhaps the largeness of heart might interfere with the largeness of intellect. On the other hand, they might compare spoons and loops, and if long enough loops were used they might be applied to certain other uses! He pointed out that what he (the speaker) wanted was constant results, not high figures. They all knew that investigators were acquainted with a margin of error, and that if they could work with sufficiently small dilutions the higher would be the number. It must be remembered that they were always working against the same standard —carbolic acid—and that that is a solution and not an emulsion, and must not be judged by the same rules as an emulsion. If they could be sure of getting constant results it did not matter whether the *B. coli* was more active than the *B. typhosus*. They had to remember they were working against one standard. Carbolic acid must be taken as the standard with which the disinfectants are compared, and by which one disinfectant was compared with another. He emphasized the point that it did not matter to them which was the best disinfectant, they wanted the best. With regard to bullock's heart, did it matter so much if they were using the same bullock's heart or if they were using Lemco? If Lemco is giving artificial values, then, said Professor Woodhead, we must give it up. There was no disinfectant on the market which would give the Rideal-Walker figures if the test is performed in what they (the authors of the paper) considered to be a fair way. With regard to the particular temperature, up to 80° the carbolic acid co-efficient rises, and two or three degrees past this there is a fall. Therefore, if they were to obtain the best results one must determine the temperature at which one is going to work. He urged that an arbitrary standard in that case was not applicable everywhere. He did not wish to doubt the value of the Rideal-Walker method, be-

cause he thought it was of extreme value, but he must protest against their being expected to accept it as a final standard. (Dr. RIDEAL: Conventional standard.) With regard to the difference between *B. coli* and *B. typhosus*, it was almost negligible, and certainly not so great as to interfere with the value of the test. In conclusion, he would only say that if they had differed there was certainly more agreement in the discussion than he had expected.

The authors of the papers were heartily thanked for their contributions, on the motion of the President.

The following paper was taken as read:—

THE INTERPRETATION OF WATER ANALYSIS REPORTS

BY J. E. PURVIS, M.A.

It is impossible to fix any standard by which waters can be judged and condemned. It is not sufficient to judge each item of an analysis either by itself or compared with some standard; nor is it sufficient to compare each item with the other items; because what might be satisfactory in one water might be condemned in another. Sometimes the analysis of a water would indicate a certain amount of danger, for example, the following numbers are the figures obtained from official reports:—

	A.	B.
Free ammonia	0·004	0·0032
Albuminoid ammonia	0·014	0·1400
Chlorine	2·100	5·2000
Oxygen absorbed in two hours at 80° F.	0·124	0·0130
Nitrogen as nitrates	0·285	0·0200
Microbes . . . per c.c.	214	214

In Sample A the albuminoid ammonia, the chlorine and the oxygen absorbed indicate some contamination, but the bacterial analysis gives a low figure. This water was supplied to a large town, and is considered to be a good water.

In Sample B the albuminoid ammonia, the chlorine and oxygen absorbed figures are all high, and the figures would indicate some pollution. As a matter of fact, this water was bacterially pure, and it could not be condemned as a bad water for drinking purposes. Other analyses could be given which would prove that no final judgment can be given either on the result of the chemical analysis, or in some instances even on bacterial analysis.

With regard to the bacterial analysis, it all depends upon the type of bacteria found in the water. If the bacterial body is non-pathogenic, the presence of other bacteria would not necessarily condemn the water. But besides these considerations there are certain rules which appear to be necessary before a final judgment can be delivered upon any water. Of these (1) the history of the water should be supplied to the analyst. He should know the geological history of the water, because the organic contents of strata differ very considerably. (2) The rainfall before the analysis and after the analysis should be obtained, because it is found that a heavy rainfall before analysis means that the amount of the constituents, chemically and bacterially, are not the same as compared with the analysis before the rainfall. (3) The method of storage and of distributing the water should also be considered, for it is obvious that both imperfect storage and imperfect distribution may be serious sources of danger. (4) The surface drainage may be a factor ; the outlets, particularly of wells, are also of importance in any water collecting area. (5) A bacterial analysis should always go hand in hand with a chemical analysis. And both the chemical and bacterial analysis should be done regularly and frequently, so that any variation in the numbers obtained may be at once observed and traced. (6) And finally, the final judgment with regard to the quality of a water should rest with the chemist and bacteriologist in collaboration ; for a water which from a chemical point of view is organically pure may bacterially contain the germs of disease. Or, on the other hand, a water bacterially pure may chemically be dangerous or suspicious.

So far we have been considering the organic and bacterial analysis of waters, but the dangers to health may arise both from hard and soft waters, and in these cases the results of the chemical analysis are probably complete and final, It can scarcely be said that soft water is free from danger, for it is well known that soft waters which are distributed by means of lead pipes dissolve a certain amount of lead, and lead poisoning in many cases has been a result of such contamination. With regard to hard waters, the danger is probably not so marked or important ; but that the waters which are too hard are at least unhealthy cannot be denied, and more particularly when such waters are being used by children or invalids. The limitations, therefore, of an analysis of these two important items disappear, and the word of the chemist can be taken as final.

SOME OLD ENGLISH HERBALS IN THE BOTANICAL LIBRARY AT CAMBRIDGE

By J. Reynolds Green, Sc.D., F.R.S.

The early writings concerned with botany and materia medica were little more than a chaotic mixture of magic, astrology, and the healing art as then understood, and anything like accurate knowledge emerged but gradually. On the Continent progress began earlier than in England, but the pioneers can be traced no further back than Brunfels (1530), Fuchs (1542), and Bock, a little later. With them we have for the first time the idea of making lists of plants or herbals, but the arrangement of the material was primitive in the extreme. These early herbals were in the main based upon the *Hortus Sanitatis*, ascribed to Cuba, which dated back to 1485, a copy of which we have in the Library. This work, however, does not come into the subject of this paper, and is only mentioned as it was largely the source of the *Grete Herbal*, which was the first serious publication in English, appearing in 1516. It was a small folio of about 350 pages, exclusive of the preface and index. Its imperfections were great, though no doubt its compilation was an achievement for the time. Turner, whose first work displaced it, said of it that it "was full of unlearned cacographies and falsely naming of herbs." It contained scarcely any description of plants, and though it was freely illustrated, in several instances the same figure was prefixed to different plants. Some of the figures were absurdly unnatural: in the representation of the mandrake, for instance, two perfectly human figures were drawn with the plant springing from the head of each.

Passing by some smaller works which are not represented in our collection, the first English book which is worthy of mention was the work of the first English botanist, William Turner, scholar and divine. This volume, called by its author *A New Herball*, was published in 1551, and was a black letter folio, most of the plants described being illustrated by figures. This was the first part of a work intended to be a history of plants, the second part appearing in 1562 and the third in 1568. In these writings Turner shook himself free from the obscurantism of the writers who preceded him, and showed himself no slavish adherent to the dicta of Dioscorides and Pliny, like so many of the Continental authors. In the more advanced countries of Europe the desire to recover the medicinal plants of the Greek and Latin physicians

had been a considerable factor in the comparative study of the plants indigenous to each, but Turner used the ancients rather roughly, preferring, as he said, to give credit rather to his own experience than to "Pliny's Hearsay." "Because," he said, "I would not be like unto a cryer that cryeth a lost house in the market and telleth all the marks and tokens that it hath, and yet neither saw the house, neither could know the house if he saw it. I went into Italy and into divers parts of Germany to know and see the herbes myself, and to know by practice their powers of working, not trusting only to the old herb wives and apothecaries, as many physicians have done of late years, but in the matter of simples myne owne eyes and knowledge."

The great defect of Turner's work was the utter absence of any attempt at methodical arrangement of his plants—a feature shared by the work of his Continental contemporaries. Attempts, more or less successful, were made to remedy this by his successors, the most noteworthy being met with in the writings of L'Obel, who, though born in Holland, spent a large portion of his life in England. His most important work was the *Stirpium Adversaria*, dedicated to Queen Elizabeth in 1570. Its plan seems to have been the first sketch of a natural method of classification of plants, though it was extremely crude and incomplete. He grouped them into forty-four large tribes or families, using as boundary lines rather the external appearance or habit of the whole plant, but there was a lack of precision, for he did not lay down definitions or characters. He described each species included in his families, giving also its time of flowering, locality, and habitat. All this showed a great advance on Turner's work. L'Obel was a physician, and in the *Adversaria* his medical bent can easily be recognized, for the book was partly an investigation of the botany and materia medica of the ancients, especially of Dioscorides.

In 1576 L'Obel published a second great work, his *Observationes*, which was embellished with 1,486 figures from blocks that had been cut for the Continental writers; they may still be seen in the Musée Plantin at Antwerp.

These writings were of great value from the purely botanical point of view, and were alluded to appreciatively by Sachs in his *History of Botany*.

Passing by the contemporary work of Lyte, not represented in our collection, the next herbal that claims our attention is the one which was the greatest botanical production of the six-

teenth century, the Herbal of Gerard, which was the outcome of his appreciation of the medical needs of the time. It was based in the main upon the *Pemptades* of Dodoens, which was a very popular book at the time, particularly among the physicians, as it retained much of the materia medica of Dioscorides and the Arabians, while it was brought by its author abreast of the most recent discoveries of the European simples. About that time there was much activity in botanical exploration, the number of plants known was being very largely extended, and many new drugs had been discovered. More material still was the increase of knowledge of foreign plants obtained by the travellers of the Elizabethan period.

Gerard took the *Pemptades* as the foundation of his herbal, but he incorporated into it also the results of these discoveries. His classification was crude and ill-considered; he made three divisions of the vegetable kingdom, the first containing the grass-like plants, the second all herbs used in diet, physic, or for ornament and pleasure, and the third trees, shrubs, fruit-bearing plants, gums, roses, heaths, mosses, mushrooms, and sea plants. Even for the time this can hardly be considered satisfactory. He was much happier in his detailed descriptions of the several species, to each of which he appended the place and time of flowering, the names or synonyms, and the virtues or medicinal properties. The herbal appeared in folio in 1597; it contained more than 1,800 woodcuts, mainly taken from those used by Tabernæmontanus, though a few were original. Gerard claimed for the book primarily a scientific purpose, but he included in it much contemporary folklore, some of which was largely legendary.

The third of the succession of great English herbalists was Thomas Johnson, to whom we owe the great 1633 edition of Gerard's work. Some thirty-six years had elapsed since it was written, and a good deal of progress in botanical knowledge had been achieved. Johnson was an apothecary and an ardent botanist, and himself well qualified to write a new work, but with rare modesty he contented himself with taking the herbal as Gerard left it as a basis on which he grafted his own researches. It was enriched with more than 800 plants than were known to Gerard, and it contained more than 700 new figures. The work so enlarged contained about 2,850 descriptions of plants, the largest number so far included in any herbal. It made the book the most important and influential of the time, and for long afterwards.

Another notable figure comes into our field of view before the departure of those concerned in the production of Gerard's herbal. John Parkinson, florist, apothecary, and herbalist. Born in 1567, he lived till 1650, the year of the appearance of John Bauhin's *Historia Plantarum Universalis*, when Ray was twenty-two years old, and the age of the herbalists was practically ended.

The publication to which in the first instance he owed his fame was the famous *Paradisus*, which appeared in 1629, four years before Johnson's edition of Gerard. It was for the most part a work on gardening; it contained descriptions of nearly 1,000 plants, 780 of which were figured. Most of them were cultivated exotics, comprising chiefly the European flowers, with a sprinkling from Asia and North Africa, and certain species from Virginia and a few other American localities.

Parkinson attempted to bring into relation with the flower garden the principles underlying the herbals. As we have seen, hardly any traces of what we now know as natural systematic relationships had found their way into the latter, but a beginning of a sort had been made by L'Obel. In the garden not even so much as this was seen. He did, however, little more than introduce the idea of system.

The *Paradisus* was overshadowed eleven years later by the publication of what was his great work, the *Theatre of Plants*, a work intended at the outset to have been a handbook of materia medica, and to have contained accordingly only the medicinal herbs. This was the labour of many years, for owing "to the disastrous times" and other hindrances, the publication underwent repeated postponements. As time went on his original plan was given up, and he essayed the presentation of the position of botanical science of the time.

The *Theatre* was a thick, closely printed folio, whose title page, besides the figure of Adam with the spade, and Solomon, contained a small portrait of Parkinson. It contained descriptions of nearly a thousand more plants than Johnson's *Gerard*, and was more exact than the latter in pointing out the places of growth, and in the enumeration of synonyms, The illustrations on the whole were poor. Its arrangement was confused and purely empirical, being avowedly founded on the known or supposed qualities and virtues of the plants described.

If we compare carefully the herbals which we have noticed we can find signs of a gradual change of plan in their arrangement.

At first purely empirical, mere lists of plants whose importance lay in their medicinal properties, they showed by slow degrees the development of the idea of botany rather than that of materia medica. So far this development can be traced to the *Paradisus* of Parkinson, his larger work reverting in the main to the older idea. We have thus in the series of herbals a kind of introduction to a classification of plants, an indication of the search for system which reached a greater development a few years later under the auspices of Ray and of Morison. This idea strikes us somewhat forcibly in the last of the herbals which calls for notice here, the *Phytologia Britannica* of How. We have a further feature of much interest presented by this volume in the shape of a distinction between native plants and those of foreign origin, so that the *Phytologia* may be looked upon as the first English flora.

It was published in London in 1650, as a small 12mo volume of 133 pages. It contained the record of 1,220 plants, the descriptions of many of them being copied verbatim from Johnson's *Mercurius*, but a great number were original. These were based upon actual exploration of the country by a considerable circle of ardent friends of the author. The plants were arranged in alphabetical order of the Latin names, the synonyms which had been used for them being quoted and their localities in many cases specified. They were nearly all flowering plants, only a few mosses and fungi being included.

This publication thus marked what was practically the end of the period of the herbalists. The new departure became extensively followed after Ray had developed the idea of systematic classification. For its preparation exploration of the country and search for its peculiar or special plants were for the first time seriously attempted, and the little band of pioneers did good service in working out a basis for the British flora proper. Not that they were in all points successful—many of the plants were very doubtfully indigenous, and others inaccurately named. Still, they mark the epoch at which the herbal gave place to the flora, and botany in England became a branch of science.

Mr. G. C. Druce said they were very fortunate in having Professor Green, who had brought to completion the *History of Botany*, commenced by Sachs, in a manner which had earned for himself the commendation of the botanical world, to bring such an interesting exhibit before them. The volumes included some of great interest and rarity, most of Turner's Herbal having belonged to

Professor Mostyn, one of the Cambridge professors of botany, and written by the Father of British Botany, himself a Cambridge student. Time would not allow now of any discussion, but he would say how pleasing and valuable such a paper was, coming, indeed, after a somewhat heated discussion, and especially interesting as being prefaced by one with whom pharmacists had been so closely connected, and who had made himself a recognized authority on ferments. He might add that at Oxford they had a copy of L'Obel's *Adversaria*, which had been cut up, probably by the author for the preparation of a second edition. This had passed into the hands of How, already alluded to as the author of the *Phytologia* of 1656, and in turn had belonged to Goodyer (whose name is commemorated in the Orchidaceous genus *Goodyera*), a contributor to Gerard's Herbal, and from him given to Madgalen College.

Mr. F. H. ALCOCK desired to know whether the *Paradisus* of Parkinson was the book on the title-page of which was the mediaeval play on his own name, "Paradiso in sole," Park-in-sun, which was so frequently adopted by authors in those days. He was led to ask this question because a well-known Conferencer of the Midlands, who desired him to express to the President his regret at not being present, suggested that the book was well worth inspection, and no doubt would be one of the books commented upon by Professor Green in his paper.

In reply, Professor GREEN said it was the book referred to by Mr. Alcock.

NOTE ON TURMERIC

BY F. H. ALCOCK

This drug has had a place in the B.P. since 1864, but, as it is only officially recognized as a reagent, it appears in the Appendix. This is perhaps the reason why it has escaped observation, for in the many useful papers on the ash of drugs which have appeared from time to time in the pharmaceutical literature, I have not been able to find a record of the amount of ash usually obtainable from turmeric. This drug has a very wide application, but in the Midlands it is still used as a colouring agent for the finest quality of lacquers, and for this purpose must be of the highest quality. Many samples have come under my observation in recent years, and as some of the data which

are required to establish their genuineness may prove of interest to pharmacists, they are given below in tabulated form. The ash percentage obtained is put in the first column, the percentage of loss at 212°F., which represents moisture and the volatile oil in the second column, and the amount soluble in 90 per cent. alcohol is given in the third column, and a note on the sample in the last column. No special remark is required in the matter of the *modus operandi*, except to note that a platinum dish was used throughout, and perhaps it should be stated that for the figures in column three the aliquot part method was used, 1 Gm. being mixed with 40 c.c. of 90 per cent. alcohol and macerated three days, and 20 c.c. removed and evaporated until very little further loss was experienced at a temperature of the water-bath with water boiling slowly. As a check I have used the Soxhlet's fat extractor to exhaust the powdered turmeric of its colouring constituents, and a very tedious process it is to complete, requiring about seven hours, and the yield is but a little more than by the aliquot part process, and perhaps not worth the trouble to pursue. (Aliquot part, 9·2; Soxhlet's, 9·7.) The lumps were cut up into small pieces and then ground in a coffee-mill, and the powders were those of commerce.

No.	Ash obtained.	Loss at 212° F.	Alcohol Solubility.	Description.
	Per cent.	Per cent.	Per cent.	
1	7·2	11·5	9·0	Powder (1896).
2	6·44	11·1	9·5	Powder (1907),
3	7·1	10·0	8·5	Powder (laboratory).
4	5·25	11·5	5·0	Powder (retailer).
5	5·8	8·5	9·5	Lump (Museum).
6	6·6	11·4	7·5	Powder (1) (wholesaler).
7	5·2	11·0	6·0	Powder (2) (wholesaler).
8	6·4	11·7	7·0	Powder (retailer).
9	5·7	11·3	6·0	Lump (retailer).
10	5·4	7·4	7·0	Lump, long (wholesaler).
11	6·62	10·4	8·0	Lump, round (wholesaler).
12	7·0	8·0	2·5	Lump, round, outside (wholesaler).
13	5·0	12·5	7·0	Lump, round, inside (wholesaler).

Sample No. 4 was greasy, and quickly imparted a greasy coloured stain to the paper in which it was wrapped at the time of purchase, which suggests that such samples should be supplied in parchment paper or in bottles. The nature of the

ash seemed to vary; some fused readily and assumed the green tint characteristic of the presence of manganese, whilst No. 12 contained ferric oxide. This sample was obtained from "round" pieces by slicing the exterior, and No. 13 was from the interior of a "round" piece, the figures suggesting that not much of the exterior finds its way into commercial powder.

Discussion.

Mr. N. H. Martin thought that this paper was a valuable contribution to the Conference, and they were indebted to the author for bringing the paper before them, because, although under the Sale of Food and Drugs Acts turmeric might seem unimportant, they never knew when a dispute might arise in connexion with it.

The President voiced the thanks of the Conference to the author for his paper.

The following paper was read in abstract by Mr. Alcock:—

THE EFFECT OF AGE ON THE COMPOSITION OF OIL OF ANISE.

By Arthur W. Knapp, B.Sc., F.I.C.

Mr. J. F. Liverseege, the public analyst for the city of Birmingham, in his report for the fourth quarter of 1909, mentions the examination of twelve samples of oil of anise, and writes that one of them "melted at 8°C., and had a specific gravity of 1·012, which is unusually high. It also differed from the other samples in being miscible with spirit. After a vain search for various adulterants, I came to the conclusion that the sample was genuine, but had been kept for some years. As the matter was of interest, I communicated with the vendor, and he informed me that the oil had been in stock for eight or ten years, and that he purchased it from a high-class London firm. I sent a sample of the oil to a member of the Pharmacopœia Revision Committee. He also found its characters to be extraordinary, and expressed the opinion that it was a genuine sample obtained from aniseed, and not from the usual star anise; he thought that a caution with regard to the changes likely to occur in oil of aniseed on keeping might advisably be included in the revised British Pharmacopœia."

Substance.	Sp. Gr. at 15·5° C.	Optical Rotation 100 Mm.	Melting Point.	Solubility in 90% Alcohol by Volume.	Residue after Evaporation at 100° C.	Per cent. Iodine absorbed (Wijs).	Refractive Index.*
Fresh oil of anise .	0·980 to 0·990	0 to − 2·0	above 15°C.	1 in 3 of alcohol	9% (Umney)	115 to 125	1·5566 at 16·5°C., D line (Parry). 1·552–1·558 at 25°C., D line ? (Hill & Umney).
Mr. Liverseege's sample, over 8 to 10 years old	1·012	+0·2	8°C	miscible in all proportions	18% (Umney) 25·8%	113	—
Mr. Alcock's sample, over 23 years old	1·092	+1·5	remained liquid at —15°C.	miscible in all proportions	63%	58	1·539 at 16°C., sodium flame.
Anethol . . .	0·987 at 21°C.	inactive	21·3°C.	very soluble	—	—	1·5615 at 18°C., D line ? (Tankard). 1·617 at ? °C., H line (Thorpe).
Anisic Aldehyde .	1·126	—	—4°C.	—	—	—	—

* It is to be regretted that standard conditions for taking and stating the refractive indices of essential oils are not yet agreed upon.

By the courtesy of Mr. F. H. Alcock, F.I.C., I had the opportunity of examining a very old sample of oil of anise. Mr. Alcock purchased this sample twenty-three years ago from a well-known firm of good repute, and he has every reason to believe that it is a genuine sample of Chinese oil obtained from the star anise (*Illicium verum*).

The sample was pale yellow in colour (2 ins. were matched in Lovibond's tintometer by yellow 5·0, and red 0·8.) Its odour was fainter and less sweet than fresh oil of anise, and its taste was bitter. The figures I obtained are tabulated below. The figures for Mr. Liverseege's sample, together with those generally given for the pure fresh oil, for anethol, and for anisic aldehyde, are added for comparison.

From the above figures it appears that as the oil of anise ages:

(1) The specific gravity increases.[1]

(2) The optical rotation passes from left to right. (Dextro-rotation is often taken as an indication of adulteration.)

(3) The solidifying and melting points of the oil fall.[1] (I cooled Mr. Alcock's sample in a freezing mixture to —15°C., with constant stirring; it became more viscous, but did not crystallize.)

(4) The solubility in alcohol and water-alcohol mixtures increases.[1]

(5) The percentage of oil that can be evaporated at 100°C. decreases. (The above figures for residues show that a remarkable change has taken place in the oil; they were obtained by evaporating the oil in shallow dishes for four hours on the water-bath and seventeen hours in the water-oven. The evaporation was practically complete in four hours. The residue, which was sticky and semi-solid, had a refractive index of 1·544 at 16°C. for sodium light.)

(6) The percentage of iodine absorbed decreases.

(7) The refractive index decreases.

(8) The percentage of oil boiling above 230°C. increases.

Thus on fractional distillation the oldest sample gave below

[1] These confirm the statements in Mr. Squire's paper on "Oils of Anise" (*Pharmaceutical Journal*, 1893, p. 106), which arose from the discussion following Mr. Umney's paper on the congealing point of oil of anise (Feb., 1889). During that discussion Prof. Attfield said he had examined the oil in the Museum and found the freezing point low, and added, "Perhaps time has changed it from what it was to something else." (Laughter.) They laughed, yet Prof. Attfield's suggestion was correct.

oils showing much too high a density to be normal. On examination it was found that the samples consisted of a bland fixed oil, probably peach kernel oil, to which a considerable proportion of the costly essential oil or attar had been added. He was struck by the fact that Mr. Knapp's sample gave 63 per cent. of residue on heating at 100° C., and would ask whether this might not be due to some fixed oil. On trying to evaporate a few drops while sitting in the meeting, he imagined he detected a camphoraceous odour, but the anisic odour was so persistent as to cloak any other, and one could not speak with any confidence. He had a specimen of oil of anise which was probably between forty and fifty years old, and it did not show the same kind of thickening as Mr. Knapp's sample. There could be no doubt, as Mr. Finnemore had pointed out, that the absence of any data as to the original or normal condition of this sample made it impossible to base any argument on the facts submitted. They had not sufficient information to prove that this was a genuine oil of anise, originally possessing the normal characters, which had got into its present condition by the lapse of twenty-three years.

Mr. Alcock, in replying to Mr. Rutherford Hill, said that the fact that the oil of anise was entirely soluble in alcohol and contained no free acid did away with the possibility of fixed oil being present. As to the genuineness of the oil, there could not be the slightest doubt on this point if he (the speaker) were to give the name of the person from whom the sample was purchased. With regard to the thickening, he would show a sample of oil of savin (produced), and the meeting would see that the same thing was going on. Undoubtedly, under certain conditions there must be thickening. He had suggested to Mr. Knapp to take the vapour density and saponification number of the sample. The former he did not think was of value, because of the complex nature of the oil, but he did take the Koestorffer saponification value, and found it to be 78·4, while a sample of oil from Messrs. Southall Brothers and Barclay gave 4·9, and Dieterich gives 5·1.

CINNAMON BARK OIL

By John C. Umney, F.C.S., and C. T. Bennett, B.Sc., F.I.C.

When we announced the title of this paper it was our intention only to refer to certain results obtained in the distillation of

cinnamon bark and the physical and chemical characters of the oils produced, but our intention has been somewhat modified by certain statements that have recently been made regarding the handling of essential oils containing constituents easily separated and assayed.

Mr. Charles A. Hill, in an admirable paper on cinnamon bark oil, referred very pointedly to the probable admixture of true cinnamon bark oil with cassia oil or synthetic cinnamic aldehyde and pointed out that if cinnamon bark oil be retained in a pharmacopœia and in pharmacy, then it must be for some reason obviously other than the percentage of cinnamic aldehyde that it contains.

The justification or otherwise for using or mixing oils containing the same active constituents has been brought into some prominence by a statement recently made in a paper read before the Perfumers' Association in New York by Dr. F. C. Dodge.

In that paper he is reported to have made the following assertions: "Oils of equal purity as regards sorts may vary enormously in value and indeed an impure oil may sometimes be of better quality than a strictly pure one. For example, an oil of cinnamon bark, low in aldehyde, may be, and possibly often is, improved by the addition of aldehyde from other sources, or an oil of bay, deficient in phenol, as frequently happens, may be brought up to the standard by judicious admixture with eugenol obtained elsewhere."

Would he go further than this and follow with the statement that an oil of dill may be improved by the addition of a certain quantity of carvone from caraway oil, that an oil of pimento may be improved by the addition of eugenol from clove oil? In such case one would never know exactly where one was in dealing with oils where a constituent was common to two or more of them.

Against this statement, therefore, we strongly protest, and whilst oils containing the same important constituents are official in a pharmacopœia, then it must be obvious that it is for some definite purpose, as in the case of dill and caraway, pimento and clove, and in the case of cinnamon bark oil, which is official in the British Pharmacopœia, and not cassia oil; and, of course, the oils must answer *characters* as well as *tests*.

There can be no two opinions about the beautiful aroma and sweet taste of cinnamon bark oil, and the very great ad-

vantage it possesses in flavour over cassia oil or artificial cinnamic aldehyde, although for the purpose of soap perfuming and similar uses undoubtedly cassia oil is valuable.

We have only to remind our hearers that the value of cinnamon bark oil is at least ten times that of cassia; that the value of dill oil is three times that of caraway oil; and that oil of pimento is, as a rule, practically double the price of oil of cloves, to see to what a dangerous point one would be brought by the adoption of such principles as have been recently advocated in America by Dr. F. C. Dodge.

If such principles be accepted, then it will be necessary to frame somewhat different tests from those which have hitherto been put forward, and to insist that where oils are required for certain odorous principles that they possess, apart from certain well defined constituents, the tests shall be such as will admit of little chance of addition of a particular chemical constituent obtained from a cheaper source.

In dealing with the question of the oils of cinnamon and cassia of commerce, one must not lose sight of the fact that certain of the pharmacopœias describe as oil of cinnamon the oil of cassia, that is to say, the oil derived from *Cinnamomum cassia.* It is somewhat strange that the United States Pharmacopœia should describe the oil as oil of cinnamon or oil of cassia, whilst, in addition, that pharmacopœia contains monographs for *Cinnamomum Zeylanicum,* the Ceylon cinnamon, and also the Saigon cinnamon.

The German Pharmacopœia also recognizes the oil of cassia under the title of oil of cinnamon, but of the other important pharmacopœias the Spanish, French, and the recent Italian recognize the true oil of cinnamon bark, the first-named being of specific gravity 1·004 to 1·006.

We have recently distilled considerable quantities of cinnamon bark, with a view to determining the percentage yield and characters of oils distilled from the various grades of cinnamon from the unbroken quills to chips, and these experiments we have carried out in continuance of those that were conducted in our laboratories in 1893. In the paper by one of us (see *Pharmaceutical Journal* [3], **25,** p. 949) is recorded the examination of samples of cinnamon oil of our own distillation and other English distillers, having specific gravity of about 1·024 to 1·029, but in the case of these oils we are not confident that every care was taken to mix together the heavier portions of the oil with

the constituents lighter than water which are present and have a most definite odour value.

In repeating our experiments recently, we were much struck with the fact that, taking every precaution in the collection of all the fractions of the oil, we could not obtain a higher specific gravity than 1·016, and we took the opportunity of conferring with our good friends, Messrs. Stafford Allen and Sons, Limited, to see how their results accorded with our own. They have been good enough to give us particulars of these results.

In our own experiments the average percentage of cinnamon oil obtained from quills and chips was as under :—

	Percentage Yield.	Specific Gravity.
Bold Quills	0·84	1·006
Broken Quills	0·71	1·016
Chips	0·56	0·996

The full particulars of those distilled by Messrs. Stafford Allen and Sons, Limited, for which we are indebted to Mr. T. Brewis, and which extend over some years, are as follows :—

Temperature and Pressure	Lb. Wt.	Quality.	Oils, per cent.	Sp. Gr. at 15°C.
Low temp.	54	chips	0·35 light oil	0·984
Low temp.	50	,,	0·26 ,,	—
			0·25 heavy oil	—
Low temp.	50	,,	0·16 light oil	—
			0·32 heavy oil	—
High press.	224	,,	0·62 bulked	1·022
Low temp.	150	,,	0·30 ,,	0·9892
High press.	224	,,	0·53 ,,	—
High press.	448	,,	0·51 ,,	—
High press.	448	,,	0·49 ,,	—
High press.	448	,,	0·53 ,,	0·9985
High press.	448	,,	0·67 ,,	—
High press.	336	,,	0·70 ,,	—
High press.	241	,,	0·91 ,,	—
High press.	56	,,	0·41 light	0·988
High press.	42	broken quill	0·77 light	1·002
			heavy	1·018
High press.	54	chips	0·45	1·013
Low press.	587	quill	0·93 bulked	0·994
Low press.	1,094	,,	0·93 ,,	0·997
Low press.	192	,,	1·04 ,,	1·009
Low press.	291	,,	0·91 ,,	1·008
Low press.	1,060	,,	1·0 ,,	1·005 quills, fine
Low press.	56	broken quill	0·3 ,,	1·003

From these results it would almost appear that the characters hitherto accepted for cinnamon bark oil have hardly been based upon complete normal distillates of the bark, and that the specific gravity lower limit should be dropped very considerably, as compared with the ideas put forward by Hill and one of us (Umney) in the paper on the suggested monograph for a new B.P.

The following constants obtained from various oils and fractions of oils support this view :—

No. 1.—Very fragrant, very sweet, but not a normal oil, imported direct from Ceylon.

	Specific Gravity at 15°C.	Refractive Index at 25°C.
Original Oil	0·944	1·5178
Fraction 1, 20%	0·867	1·4790
„ 2, 20%	0·883	1·4880
„ 3, 20%	0·936	1·5115
„ 4, 20%	1·008	1·5564
Residue, 20%	1·005	1·5748

Mr. C. A. Hill, in his recent paper, makes a considerable point of the refractive index of true cinnamon bark oil constituting a reliable indication of its purity.

No. 2.—Distilled by Wright, Layman, and Umney from broken quills.

	Specific Gravity. 15°C.	Refractive Index. 25°C.
Original Oil	1·016	1·5760
Fraction 1, 20%	0·890	1·5002
„ 2, 20%	0·994	1·5568
„ 3, 20%	1·032	1·5864
„ 4, 20%	1·048	1·5928
Residue 5, 20%.	1·051	1·5746

No. 3.—Distilled by Wright, Layman, and Umney from Ceylon "chips."

	Specific Gravity. 15°C.	Refractive Index. 25°C.
Original Oil	0·996	1·5634
Fraction 1, 20%	0·886	1·4934
„ 2, 20%	0·984	1·5442
„ 3, 20%	1·027	1·5750
„ 4, 20%	1·046	1·5912
Residue 5, 20%.	1·051	1·5736

No. 4.—Distilled by Stafford Allen and Co., Limited.

	Specific Gravity. 15°C.	Refractive Index 25°C.
Original Oil	1·004	1·5615
Fraction 1, 20%	0·884	1·4925
„ 2, 20%	0·993	1·5565
„ 3, 20%	1·029	1·5826
„ 4, 20%	1·048	1·5934
Residue 5, 20%	1·052	1·5729

The following two samples were of Continental distillation, guaranteed pure :—

No. 5.

	Specific Gravity. 15°C.	Refractive Index. 25°C.
Original Oil	1·021	1·5840
Fraction 1, 20%	0·918	1·5142
„ 2, 20%	1·024	1·5878
„ 3, 20%	1·042	1·6033
„ 4, 20%	1·048	1·6078
Residue 5, 20%.	1·053	1·5955

No. 6.

	Specific Gravity. 15°C.	Refractive Index. 25°C.
Original Oil	1·030	1·5920
Fraction 1, 20%	0·963	1·5428
„ 2, 20%	1·026	1·5883
„ 3, 20%	1·040	1·6002
„ 4, 20%	1·050	1·6068
Residue 5, 20%.	1·058	1·6070

It is at once observed that the light fractions found in the normal oil are not present in these two, and the questions arise :—(1) Have only the heavy fractions been collected inadvertently ? (2) Have the light fractions been intentionally rejected to obtain compliance with the B.P. 1898 requirements ? or (3) do the oils contain cassia oil or synthetic cinnamic aldehyde, which has the following characters: Specific gravity, 1·073; refractive index, 1·6160 ?

We cannot say, but whichever be the solution of the problem it is evident they have not the characters of normal distillates of cinnamon oil. They are, moreover, distinguishable by odour and nearly so by taste. What then is the position ? Is cinnamon oil to be viewed as a flavour, to be judged by its sweetness and delicacy, or as a remedial agent required to contain a definite percentage of cinnamic aldehyde ? If the former, it should be a light normal distillate; if the latter, let us have pure cinnamic aldehyde, as does the U.S.P. (though *Cinnamomum cassia* oil, as we have said, is also official) or 80/85 per cent. cassia oil.

Discussion

The President, in introducing the discussion, remarked that this paper raised a very important question. He thought that the fact that genuine essential oil could only be converted into an article answering the official requirements by adulteration was a subject which required some definite remarks.

Mr. E. T. Brewis said that he had little to add to what had already been said by Mr. Umney. He had noticed for a number of years that in no case did he get a true cinnamon oil distilled in England to come up to the specific gravity required by the British Pharmacopœia of 1898. He had examined a sample of pure cinnamic aldehyde which gave a refractive index of 1·6175, while the refractive index of a cinnamon oil known to be pure and distilled from "Fine Quill" was 1·5640. He drew attention to the marked superiority in odour and flavour of true cinnamon oil.

Mr. Martin thought that the paper was of supreme importance, and they were indebted to Mr. Umney for exposing the statements of Dr. Dodge and the method of certain expert fabricators in America. The British Pharmaceutical Conference had always stood for purity in drugs and honesty in commerce. Referring for the moment to the paper on oil of anise, he said

it was a fortunate thing that this sample of oil of anise fell into the hands of an analyst of considerable wisdom who did not advise a prosecution, because although the sample was of rather poor quality it was genuine. It would be an extremely hard thing when an honest attempt was made to supply a genuine article if a trader was to be branded as a dishonest man.

Mr. T. E. LESCHER remarked that his firm had undertaken a number of analyses of cinnamon oils, and their experience was, taking six, seven or eight Continental samples, that about two were pure and the rest obviously adulterated. There was no doubt that there had been a good deal of sophistication of this oil. The question was to decide whether it was the flavour or percentage of the chemical constituent which was desired; he thought it was the flavour which was the more important. It was quite easy to test that by the nose. As regarded the medicinal value of the oil, oil of cinnamon was coming into prominence on account of its medicinal value, especially as a specific for influenza. But was that due to the cinnamic aldehyde or to the whole of the oil?

Mr. T. STEPHENSON emphasized the point as to the medicinal use of the oil. Two or three years ago, in the *British Medical Journal*, a writer whose name he had forgotten said that only the purest Ceylon cinnamon oil should be used as a remedy for colds and influenza.

Mr. ALCOCK interposed a word of warning. He knew an eminent analyst, who was also a pharmacist, who had told him that if he found any synthetic element present he would feel bound to condemn the oil.

Mr. UMNEY, replying to the remark as to the medicinal value of the oil in influenza which had come into vogue recently, thought the statement which Mr. Stephenson had quoted was rather loosely made. If these specifics were made with synthetic oil, or if oil of cassia was used, they would never be taken, as they were far too nasty.

The PRESIDENT conveyed the thanks of the Conference to the authors for this excellent paper.

THE PROPOSED ESSENTIAL OIL MONOGRAPHS

BY H. JOHN HENDERSON

There is no doubt that the system of publishing suggested official monographs for criticism before including them in the

Pharmacopœia is a good one; the advantages are obvious, yet it is a little doubtful whether the procedure adopted is the best that could be devised. There is something anomalous and irregular in a committee appointing two or more of its members to publish what is to all intents and purposes an official document, in which they dissociate themselves from the committee which appoints them to express individual views. A tentative report of an official character should be an impersonal one, a considered judgment, formed upon the evidence of published facts. It is the very antithesis of the individual view. There have been many individual views published on the essential oils during the last ten years, the whole of which material was available for the use of the Committee, and which, properly digested, would have formed valuable material for criticism.

It is doubtful whether the introduction of more stringent tests will be productive of anything greater than a stimulus to further activity in a certain kind of research of an undesirable character. The thought also obtrudes itself as to whether the essential oil question is not in danger of being lost in a wordy wilderness, for although it would be difficult to imagine a stronger ground for rejecting an oil than the fact that it has not been distilled from the proper material, yet it is considered necessary to assert that an analyst is justified in doing so. The attempt has been made to define the indefinable by using terms of indefinite meaning, such as "normal natural distillate," which may be a distillate obtained in an unusual way. The use of the word "natural" is particularly unhappy. Again, "It may be necessary for the distiller to rectify his natural product," which probably will then become a "genuine normal product" (Hill and Umney). The use of the word "rectify" is capable of many interpretations.

The Introduction of the Refractometer

The evidence upon which it is here suggested that the refractive indices find no place in the official monographs may be briefly summarized.

(*a*) The authors have neglected to define the line in the spectrum.

(*b*) The temperature at which the figures were obtained is 25°C., instead of 20°C., which makes comparisons troublesome.

(*c*) "The refractive index of a given sample of oil is in most

cases of very little value in indicating adulteration" (Parry, *The Chemistry of Essential Oils and Artificial Perfumes.*

(*d*) "It (the refractive index) is worth observing even in those cases where (as with many essential oils) *the information obtained is not of much diagnostic value*, e.g., to compare bulk consignment and buying samples" (T. F. Harvey and T. M. Wilkie).

(*e*) "We should not consider it desirous to have the data of the refractive index put up as standards" (E. Sachsse and Co.).

(*f*) "This constant (refractive index) is precisely the one which is almost invariably the least characteristic. . . . We regard the inclusion of the refractive index of oils into a Pharmacopœia as wholly unsuitable or, at any rate, as premature. For this reason we have left this constant out of account altogether" (Schimmel and Co., "Semi-Annual Report," April, 1910).

For these reasons and because it is not pretended that these figures will tend to raise the quality, or indeed to indicate it, it yet remains for the presence of a standard for a refractive index for essential oils to be justified.

Oleum Anthemidis—The oil distilled by Messrs. W. Ransom and Son from the dry official flowers is always optically inactive (*P.J.*, 81, 1908, 683). I suggest that the optical rotation be from 0° to +3°. Schimmels ("Semi-Annual Report," April, 1909) have frequently examined Roman chamomile oils with a rotation below + 1°. These, however, were very rarely inactive. They refer to the difficulty of determining the rotation because of the colour. Brewis (*P.J.* [4], **30**, 182) refers to the same difficulty. It is true that the light is absorbed in a very remarkable way, even by an oil of a yellowish colour, yet if the observations are taken in a dark room, using metallic sodium as the source of light, the observer being efficiently screened from the glare, the illumination is sufficiently great to make the observation reliable. If the dark oil is re-distilled over water, a nearly colourless distillate is obtained which I have never yet found to display optical activity, but this is no actual proof that the original oil was inactive, as the oil may have changed with the loss of colour. The fact is mentioned to indicate a method which was adopted to overcome the difficulty of observing the rotation owing to the dark colour. The oil distilled from the dry flowers has not hitherto been blue, and that distilled from the fresh flowers is not always so. The latter is sometimes olive green, and according to Umney (*P.J.*, 1894, 949), bluish or bluish-green.

The influence which change of temperature exerts upon the solubility of this oil in spirit has been observed. Five c.c. of oil formed a cloudy solution with 0·5 c.c. of 90 per cent. alcohol, which became clear at 30°C.; 1 c.c. of 90 per cent. alcohol formed a cloudy solution at 15°C., and became clear at 20°C.; 1·5 c.c. of 90 per cent. alcohol formed a clear solution at 15°C.; 1 c.c. formed a clear solution with 6 c.c. of 70 per cent. alcohol.

Oleum Anethi.—"The carminative principle is carvone" (Hill and Umney). If true, carvone might be officially recognized in place of this oil, but upon what pharmacological or therapeutical data does this statement rest? This higher-priced oil can profitably be fortified with the lower-priced carvone, and as there is plenty of fractionated caraway oil, specific gravity 0·879, on the market, it is unlikely that the analyst will be put on his guard by the gravity being too high. It is very unlikely that this oil would be used as a source for carvone, because it would be unprofitable, for which reason Parry's suggestion that an oil with a specific gravity below 0·905 has been decarvolized is demurred to, nevertheless a maximum specific gravity of 0·910 is too low, 0·920 is better. In 1895 Umney found it necessary to distil some dill oil in order to make some accurate comparisons. This oil, distilled from fruits grown in Lincolnshire, had a specific gravity 0·9148, and an optical rotation of + 75° 25′, and would be excluded from any future pharmacopœia if the present suggested standards were adopted, as it exceeds the limits for both specific gravity and optical rotation.

Oleum Carui.—In a critical paper, "The Essential Oils of the United States Pharmacopœia" (Umney and Bennett, *P.J.*, 1905, 2, 143), the following statement is made by the authors: "No process has been included for the determination of carvone, but the physical characters are quite sufficient to *ensure* an oil containing over 50 per cent. of carvone." If this statement is correct, and it is believed to be so, the introduction of a test involving fractional distillation is superfluous, for the suggested physical standards are practically the same as those of the United States. For data concerning essential oils to have any significance at all for purposes of comparison, the practical analytical work must be conducted in exactly similar conditions, but it is doubtful whether it is possible to define conditions for the fractional distillation of such variable products as essential oils, which the personal and other interfering factors will not vitiate. Gildermeister and Hoffmann, in their book, *The*

Volatile Oils, published under the auspices of Schimmel and Co., recognize this difficulty, and attempt to meet it by using flasks of certain dimensions and by defining the rate of distillation. This was the first attempt to standardize the method, and since then further suggestions have been made regarding the position of the thermometer in Schimmel's "Semi-Annual Report," but it is not explained how the column of mercury is to be washed by the steam in their flask, when the bulb must be placed nearly opposite the distilling tube. There is but little doubt that the range temperatures hitherto published are in many cases apparent temperatures, no correction being made for the exposed column which is an important point at fairly high temperatures, as it may exceed 3°C. If the distillation is allowed to proceed from start to finish with a slowly rising thermometer, at the rate of one drop per second, the receivers being changed as the various temperatures are reached, the results obtained differ greatly from those obtained by allowing the thermometer to just reach the temperature required, and then directly it rises above it, removing the source of heat for a period long enough to allow the thermometer to fall through 20° or 30°C. before reapplying the flame.

The following extraordinary results were obtained when fractionating two samples of dill oil, one English and the other foreign :—

English Oil, specific gravity, 0·9013, a_D + 79·2°, absorption by sodium sulphite 44 per cent. by volume.

	A	B	C	D
Below 185°	19	26·0	32	31·0
185°–200°	13	5·2	2	0·6
200°–220°	4	5·6	5	3·2
220°–230°	12	11·2	10	12·6
	48 c.c.	48·0	49	47·4

A and B were by the continuous method, C and D by the discontinuous method.

Foreign Oil, specific gravity 0·9159, a_D + 73·3°, absorption by sodium sulphite 51·7 per cent. by volume.

	A	B	C	D
Below 185°C.	11·5	7·7	26·0	17·5
185°–200°	13·0	13·4	3·0	8·6
200°–220°	6·0	7·6	7·0	3·2
220°–230°	16·5	16·8	13·5	17·6
	47 c.c.	45·5	49·5	46·9

A and B were by the continuous method, C and D by the discontinuous method. A nitrogen-filled mercury thermometer graduated from 100°C. to 360°C. in half degrees was used throughout, and the temperatures are apparent temperatures. Schimmel's flask was used. I can attempt no explanation of these results; they are published to show that there is necessity for further investigation in this subject. Fifty c.c. of oil were taken for each experiment, and the distillation was stopped when the oil had darkened and decomposed to such an extent that it was useless to proceed further.

Ol. Copaibae.—It was a curious fact that the B.P., 1898, required that copaiba should yield a volatile oil having an optical rotation of —14° to —17°, yet the monograph for the oil itself defined no limit, and only required that it should be laevo-rotatory. Dr. G. Weigel, in a critical paper, suggested limits of optical activity, —5° to —25°. He pointed out that Schimmel had recorded —2°20′ to —78°48′. The *Chemist and Druggist* (March 26, 1910) admits that the suggested standards of Hill and Umney, —7° to —35°, may exclude a few genuine oils, which would press rather hardly on the unfortunate purchaser of such consignment. Moreover, this fact being admitted, the standard is useless from the legal standpoint, for no magistrate would uphold it. Umney gave as the reason for reducing the limit to —7° that a new variety of copaiba was coming on the market, which was a perfectly genuine article, and actually had a + rotation. Could this oil have been termed a "normal natural distillate" if it had been distilled after the publication of the next B.P., or would such an oil then fall into the category of "abnormal oils"? The optical rotation of copaiba is not usually recorded, but there is nothing unusual in a copaiba being dextrogyre, and the oil distilled from it laevogyre. A sample of Maracaibo copaiba was examined last year, and the following notes were made at the time in my note-book:—"The optical rotation was difficult to observe; I make it +17° in a 50 mm. tube. That it is dextrogyre there is no doubt at all; the difficulty was in determining to what extent. It was slightly cloudy at first, and no light at all was visible when using 100 mm. tube. It was carefully filtered through paper, and three variant readings were obtained, using a tube of 100 mm., +34°, +32°, +33°. The specific gravity was 0·9915, and it yielded 50 per cent. of a volatile oil, specific gravity 0·9057, $_D$ — 8·3° when distilled *in vacuo*." There are very great advantages in distilling oil

of copaiba *in vacuo* which should commend the method to distillers of the oil on the large scale. A sample of Para balsam, specific gravity 0·953, a_D −19·5°, yielded 76 per cent. of volatile oil when distilled under reduced pressure (16 mm. Hg). It boiled steadily at 145·5°C. for some time, and then the temperature gradually fell to 143·5° (uncorrected). The distillation was very rapid, all the oil coming over in five or six minutes, resin was brittle and easily powderable. Specific gravity of this oil 0 903, a_D −22·3°, soluble in own volume of absolute alcohol, soluble in 9 volumes ot 94 9 per cent. alcohol. A sample of oil, obtained from the same balsam, was distilled at first in a current of steam. The oil came over very very slowly, and the flask containing the balsam was heated over gauze, and then with a naked flame. The same yield of oil was obtained, specific gravity 0 939, a_D −11°, which shows the effect of bad distillation upon the quality of the oil.

Oleum. Lavandulae.—It was first pointed out by me (*P.J.* [4], **11,** 490) that the official specific gravity often excluded genuine English oils. The lowest gravity recorded at that time was 0 883, since which in 1903 one of the distillates of W. Ransom and Son, Hitchin, had specific gravity 0 8825, and in 1905 another had a specific gravity 0 8815. English oil of lavender, properly stored, quickly increases in gravity, e.g., an oil which when recently distilled had a gravity of 0·8846 after storing for three months had increased to 0·8856. It was once stated that some of the English distillers fractionated their oils, an idea which probably had its origin in a misunderstanding. It will be readily understood that the final runnings from a distillate are likely to be dark in colour, for which reason they are collected separately and re-distilled, the distillate being afterwards mixed with the bulk. These re-drawn distillates have sometimes a lower, and sometimes a higher specific gravity, than the first runnings, e.g., in 1903 the first runnings from one distillate had a specific gravity of 0·8825 and the re-drawn oil 0·8805, whilst in 1906 first runnings 0·8907, re-drawn 0·8973. These last runnings are but a small fraction of the bulk. The specific gravities recommended are reasonable. A reduction in the maximum is not to be recommended, as a well-matured oil, carefully stored, sometimes slightly exceeds this limit. Umney suggested (*P.J.* [4], **16,** 496), that French oil should not contain less than 36 per cent. of esters, thus by the suggested standard an inferior French oil is to be admitted, and according to Parry the Italian oil with

its sweet odour and 25 per cent. of ester is to be excluded. This ester question is threadbare. No evidence has ever been adduced to show that the esters improve the odour, or that they have any medicinal value, and its advocates cannot agree among themselves. There is no doubt that the efforts which have been made abroad, by foreign firms interested in French oils, to make the ester content the basis of valuation, has had its effect, in spite of the absurdity of their contention. Umney and Bennett (*P.J.*, 1905, 2, 146) referring to lavender oil, said, "How it will be treated in a new B.P. remains to be seen, perhaps by the inclusion of English oils only, which would give a much-needed impetus to the lavender cultivation in the country." It is much to be regretted that Hill and Umney failed to supply this much-needed impetus in their suggested monograph; possibly the statement of Dr. Attfield, in his report for 1898, page 78, has been noticed since. In the same place it will be noticed that Umney and Bennett considered that the non-recognition of the determination of the ester percentaage by the United States Pharmacopœia was "perhaps the wisest way out of the difficulty"; perhaps it would have been just as wise to have adopted the same course as our wiser cousins.

Oleum Pimento.—W. Ransom and Son distilled an oil having a specific gravity 1·021. The introduction of a quantitative test for eugenol cannot prevent the fortifying of an oil with the cheaper eugenol. It does not encourage the production of genuine oils; on the contrary, it actually induces a distiller to adjust his oils to an official standard profitably. It is useful for oil of cloves, because the oil is cheaper than eugenol.

Oleum Rosmarini.—In a summary which balanced the evidence for and against the suggested standards of Messrs. Hill and Umney, the *Chemist and Druggist* referred to the fact that the suggested optical rotation 0° to + 15° excluded Spanish (?) oils, but omitted to notice that it also excluded the majority of English oils. The same journal seems to have made a little slip, as it was the French oils which were laevo-rotatory, —8°30′ and —3° respectively, whilst the Spanish oil was dextro-rotatory in the paper to which they refer, and therefore is not excluded by the suggested optical standard. This may be as it may, it is with the English oil that I am chiefly concerned. The English oil is greatly superior to the foreign oil in aroma, and some explanation should be forthcoming as to why it has been excluded. It is quite beside the point to say that the amount distilled is

so small as to be of no importance. This may be the German opinion, but it is very unlikely that they will desire to foster an English industry. There is no doubt that the exclusion of laevo-rotatory oils is deliberate, for the oils from foreign herb, reported upon by Parry and Bennett, were distilled in the laboratories of Messrs. Wright, Layman, and Umney. They (Parry and Bennett) said: "The results of our examination prove beyond doubt that a laevo-rotatory oil is consistent with purity." It is, of course, common knowledge that the majority of English oils are laevogyre, although, as I showed (*P.J.*, November 9, 1907), an English oil distilled by Messrs. W. Ransom and Son from plants grown by them in the same situation for years yielded once an oil which was dextrogyre, although these plants have ever since yielded laevo-rotatory oils. It has been firmly established that pure rosemary oils, whether they be English or foreign, can be dextro-rotatory and laevo-rotatory, yet in the face of this evidence some of the foreign and nearly all the English oils are to be excluded from the Pharmacopœia. The English oil distilling industry requires all the encouragement it can obtain, and it will be strange indeed if genuine English distillates of high quality are excluded from the British Pharmacopœia.

Discussion

Mr. Umney remarked that one of Mr. Henderson's main points was that the paper by Mr. Hill and himself was, "to all intents and purposes"—those were his words—a communication from the Committee of Reference in Pharmacy of the British Pharmacopœia. That was not so. The Revision Committee was a committee consisting of persons who were engaged broadly in pharmacy or were engaged in chemical work, but they were engaged to a large extent in certain directions as specialists. That being the case, it was thought that it would simplify the work of the Committee if the members wrote papers on their particular specialized subjects, with a view of eliciting information and criticism, such as had been drawn from Mr. Henderson that morning. The work of the revision of the Pharmacopœia was very laborious, and it was their idea that it would facilitate matters if the criticism, which was bound to come, came before, and not after, publication. The Committee of Reference would weigh up the criticism and report to the General Medical Council, and very likely decide against those who read the unofficial communications. He did not think it would be giving away

any secret if he told them that other papers were to follow, one by Mr. Edmund White, on alkaloids, and another, by Messrs. Bird and Lucas, on oils, fats, and waxes—subjects in which each of these workers had specialized. Thus they hoped to get all criticism beforehand. The second point was in regard to the Pharmacopœia as a standard. Even while official, the standards of the Pharmacopœia sometimes had to be modified—for example, they would remember the cod-liver oil case, in which not only was the standard upset, but even the judgment of the Government laboratory was over-ridden. They knew what an admirer of Mr. Chamberlain he was, who said "what he had said, he had said," although he had since changed his politics, but he (Mr. Umney) would say that what he had said, he had said with the best of his knowledge at the time he said it. As to the question of the inclusion of the refractometer for essential oil testing, the question was difficult, one of the reasons being that a refractometer was not in the possession of every pharmacist. The Germans said that there was no need to take the refractive index, but he (the speaker) had found, on taking the reports of the German houses, that they always included the refractive index. Why, he did not profess to know. As to the value of carvone, he thought it was generally recognized as valuable as a carminative. Why children preferred dill to caraway—he forgot! He had been asked why he had changed his views in regard to copaiba; the explanation was quite simple; they found that a new variety of copaiba was coming on the market, which was a perfectly genuine article. Therefore, they enlarged the range of the optical rotation. As they were aware, there was a joint standing committee of the Pharmaceutical Society and the Society of Public Analysts, and doubtful cases, such as that of Mr. Alcock's, were often referred to members of that Committee, so that there was not much likelihood of the unfair prosecution of pharmacists. It had been said that Umney and Bennett recommended one standard for the U.S.P. and another for the B.P. As a matter of fact, that was done on purpose. They did not object to the Americans using French or English oil, but when they got nearer home they wanted the English oil used. It was very difficult in practice to give England preference; with lavender oil it might not be so difficult, but taking the case of oil of rosemary with the Spanish variety at 1*s.* 5*d.* per lb., and English at 50*s.*, what was to be done in a case like that? It was extremely difficult to make a monograph which would

give the desired impetus to home industry. As a member of the Pharmacopœia Revision Committee he most heartily welcomed criticism, and if they got the same amount of criticism on Mr. White's and Messrs. Bird and Lucas's papers as there had been on the paper by Mr. Hill and himself, they would do remarkably well. It would not be " lost in a wordy wilderness."

Mr. TAYLOR said that he was guided largely by his tongue and nose in the examination of oils; in regard to cinnamon oil this was a very accurate guide. As to oil of lavender, several years ago Kraemer said that there was no English oil of lavender and that it was only a laboratory curiosity. Generally speaking he thought statements such as these had to be taken with a grain of salt.

Mr. H. WIPPELL GADD, whilst not desirous ot discussing the paper in detail, wished to emphasize the value of the unofficial papers which were being published before the issue of a new Pharmacopœia. Such a policy, although it might involve a loss to lawyers, was of the highest advantage to pharmacists, and he regretted that anything like scorn had been thrown upon it. He emphasized the fact that the standards of the Pharmacopœia were only evidence, and were capable of being rebutted.

Mr. BREWIS said he was sorry that Mr. Henderson objected to the expression normal oil. It was possible to get what might be called a pure oil, but was not a normal oil. As an example of what he meant, he quoted the case of some pure oil of dill he had examined which gave a low gravity and high rotation. When the cause was looked into it was found that the fruit was not thoroughly ripe. He mentioned this as an instance of what he meant by a normal oil. He suggested that some experiments might be made on what he called the critical temperature of solution of oils in alcohol. With regard to what Mr. Henderson had said about the use of the refractometer, he (the speaker) regarded it as one more mesh in the net to catch adulterated oils. Referring to oil of pimento, he confirmed the figure given by the author of the paper, and considered this oil was a parallel case to oil of cinnamon; in the same way one got a low gravity, associated with a sweet aroma, and the impossibility of distilling normal oil to satisfy the requirements of the 1898 British Pharmacopœia.

Mr. MARTIN said he had no special qualification to join in the discussion, although he must take exception to the statement of Mr. Gadd that this was not a legal question. He mentioned milk as an example, and pointed out that magistrates were bound

to decide on the evidence before them. Even in the case of milk there was the danger of hardship, as cows sometimes gave milk varying in quality according to the time of milking.

Mr. GADD asked to be allowed to explain that he meant that the question of the authority of the Pharmacopœia as a standard was not a point of law but of fact, and that the Pharmacopœia standard could be rebutted by other evidence. The case of milk was not parallel; for that standards were laid down by the Board of Agriculture under powers conferred on it by one of the Sale of Food and Drugs Acts, but there were no such standards for drugs.

Mr. R. A. CRIPPS referred to several ways in which the B.P. standards could be rebutted, but thought that most magistrates would be inclined to take the B.P. as the standard for drugs unless definite evidence were produced to show that the B.P. standards were wrong, or that there was some customary and unvarying commercial standard to which the article conformed. In regard to the notorious mercurial ointment which had been referred to by one of the speakers, the custom was not uniform; one pharmacist used one dilution and another a different dilution, but if the custom was to sell the ointment of one strength and the defendant had complied with it, he thought in that case there would have been no offence.

Mr. S. F. BURFORD pointed out that when there was a standard set up, and there was presumptive evidence to show that that had been followed, the magistrates would take the view that the requirements had been complied with.

Mr. ALCOCK asked, "What is oil of dill? Is it the oil distilled in England, perhaps from foreign fruit, or is it the oil distilled abroad from English fruit?" This was a question, he thought, which ought to be settled, and the result set out. There should be some agreement on this point, and it would serve to remove the obscurity of such labels as Ol. Santali Ang. and Ol. Santali Exotic.

Mr. HENDERSON, in replying to the discussion, said he did not propose, nor was he qualified, to touch on the legal question. With regard to Mr. Umney, he would like to draw his attention to the fact that he was rather fond of altering his mind. With reference to oil of dill, he would draw Mr. Umney's attention to what he had said in 1895. In reply to Mr. Umney's remarks referring to the publication of unofficial reports, he would like to know to whom they were to report if not to the Committee

of Reference. Would they report to members of the Pharmaceutical Society ?

Mr. UMNEY : To everybody who may honour us by listening to the paper or by reading it. It was read at an evening meeting of the Pharmaceutical Society.

Mr. HENDERSON thought it must be very difficult for Mr. Umney and his colleague to dissociate themselves from their Committee. If Mr. Umney displayed the same tenacity in adhering to his suggested standards as he displayed in adhering to the valuation of English and foreign oils of lavender by means of the ester content, then he thought his critics would have a very bad time of it indeed. Assuming Mr. Umney was giving evidence in court, he thought there would be great danger that the magistrate would consider that the author might be prejudiced in any attempt to rebut the monograph. He thought that official monographs ought not to be individualistic but impersonal. Mr. Brewis had raised a point about the distillation of oil of dill, and had said that he had taken unripe fruit. Mr. Brewis should have done nothing of the sort, especially as he had access to so much ripe fruit.

The thanks of the Conference were awarded to Mr. Henderson for his contribution.

NOTE ON PERIODICITY OF PROPERTIES OF THE ELEMENTS : NEW ARRANGEMENT

BY J. F. TOCHER, B.SC., F.I.C.

The classification of the elements according to their physical properties is a subject of theoretical and general interest, besides being of practical importance to teachers and manufacturers. It is not a pharmaceutical problem, and therefore a word of apology is necessary for even this brief note.

From the purely chemical side no advance in classification has been made since the days of Newlands, Meyer and Mendeléeff. Mendeléeff's classification is admittedly an empirical one, but until physicists give us a classification on a theoretical basis completely descriptive of the periodic properties of the elements, Mendeléeff holds the field. This note describes a modification of his arrangement which may ultimately prove to have a satisfactory theoretical basis, and which, as a practical result, places elements of like properties in similar positions,

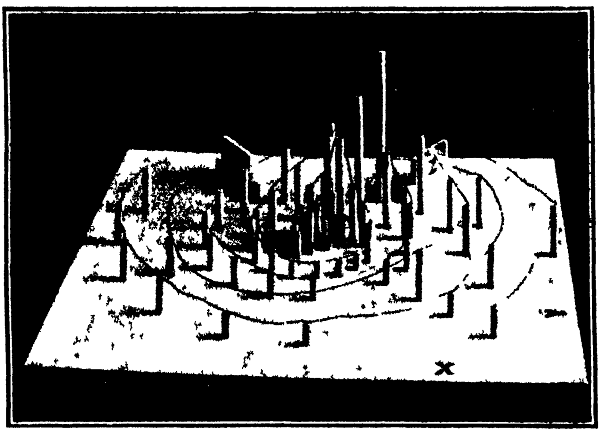
while elements with unlike properties are separated by distances proportional to the intensities of their differences.

In constructing the periodic table, the following assumptions were made :—

(1) The elements are capable of being arranged in a logarithmic spiral. This method, for two dimensions, was applied by Loew in 1897, but he did not succeed in placing elements with like properties together—in other words, he failed to give a theoretical basis to the classification.

(2) The radius vector, r, in three-dimensional space, is a function of the atomic weight and of the atomic volume of each element.

(3) The vectorial angle is a function of the valency of an element. In the spiral, it is the angle between two adjacent radii, one with an element E_n and the other with an element E_{n+1} with next higher atomic weight. The angle has the constant value $\frac{\pi}{8}=\theta$.



MODEL OF NEW ARRANGEMENT OF THE ELEMENTS.

The distance from the centre on the xy plane is proportional to the atomic weight of the element, and the height (on the xz plane) is proportional to the atomic volume. Elements on the same straight line through the centre of the model belong to the same period. The angle between any element and the next higher in atomic weight is constant. The value of the angle $\frac{\pi}{8}$, and each step of $\frac{\pi}{8}$ corresponds to an increase or a decrease of one in the valency.

[We are indebted to the Editor of the *Pharmaceutical Journal and Pharmacist* for the loan of this block.]

In order to show the relative magnitudes of the atomic weights and volumes of the element and the effect of valency as represented by an angle, a model was constructed. The atomic weight of each element is here shown as a length on the xy plane, and the atomic volume as a height on the xz plane (the plane perpendicular to the xy plane.) If valency be defined as the combining power of an element with hydrogen (when hydrogen has been found actually to combine with the element), the valency varies as sin θ, being zero along the x axis, and a maximum at 90 and at 270. The inert gases are at the base of the first quadrant, the elements F, Cl, Br, and I on the next radius, the angle $\theta = \frac{\pi}{8}$ intervening between them. The divalent elements follow on the next radiating line, then trivalent elements, P, As, and Sb, and, lastly, at an angle of 90, the elements C and Si, and the other members of that group. Thus in this quadrant (the upper right hand or first quadrant), we have all the electronegative elements in a group together, the less negative being near the less positive metals in the next quadrant. The second quadrant and part of the first contain all the heavy and noble metals, while the third quadrant and part of the fourth contain the rarer elements. Finally, the remaining portion of the fourth quadrant contains the alkali metals and their allies, and is strongly electro-positive. The atomic volume attains a maximum on the univalent radius which embraces the alkali metals and gradually falls, on passing the radiating lines, through 180°, when the atomic volume slowly increases again during the remaining portion of the circle, until the maximum is again reached. The elements of the eighth period are placed *on* the radiating line, each group of three being reckoned as one element. These elements, unless treated in this manner, do not fit the scheme.

DISCUSSION

The PRESIDENT welcomed this communication as a very interesting paper on the subject.

Mr. EDMUND WHITE thought that this was an exceedingly ingenious arrangement of the elements. The remarkable repetitions were very much like Mendeléeff's, with a still further grouping of the elements and arrangements of the groups. It was extraordinary how one found in the earth rare metals all

together. He was interested to notice that in Mr. Tocher's arrangement radium still came out on the same line as Ba, Sr, and Ca.

Mr. E. F. HARRISON was a little sceptical as to where the novelty lay; perhaps the curious formula which was on the board, and to which Mr. Tocher had not referred, explained this.

Mr. COWIE referred appreciatively to the paper, and pointed out in the new arrangement that the copper group was placed with the leading metals, and also zinc, cadmium, and mercury were together. This was very much better.

Mr. TOCHER, in reply, said that he was still working at an uncompleted problem and, therefore, this note was merely a preliminary one. He thought pharmacists might be interested in the arrangement, apart from any theory underlying it, and this was his excuse for giving the note to the Conference, In reply to Mr. Harrison, Mr. Tocher said he had not yet been able to give his arrangement a satisfactory theoretical basis, but he might say, at this stage, that he had found an empirical formula which was descriptive of the classification. From it the elements could be arranged in three dimensions, as shown in the model. Elements which were well known to be closely allied in physical properties fell into adjacent positions, indicating that the empirical equation must have some physical significance.

NATURE RESERVES

BY G. CLARIDGE DRUCE, M.A.

Nothing could be more alien to such a Conference as this than the short note which I venture to bring before you, yet we who are enjoying the warm welcome of this great University, can but rejoice that the *alma mater* of Ray and Darwin should still be such an eager supporter of natural science. To us pharmacists it is specially pleasing that our late Professor of Botany at Bloomsbury is one of its College Fellows, who has contributed to our proceedings here, and that one of our Examiners, Professor Seward, himself a recognized authority on fossil botany, now fittingly occupies the chair so long and worthily held by that great student of British botany, Professor Babington.

Some of us who are dwellers by the Isis may think that we have a more beautiful, if not a more interesting, country surrounding us than that which lies around the Cam, but I will not

labour that point before an audience doubtless in part prejudiced and with views just now somewhat distorted by the great kindness and hospitality which Cambridge knows so well how to display, but I will advance this statement with some confidence—that anything which shall enhance the natural beauties and amenities, and which shall conserve the wild life of the area in the vicinity of either seat of learning, is a most commendable object.

Coincident with national prosperity and the increase of population come the disadvantages of a diminution of uncultivated areas, which to the utilitarian are eye-sores, but which all nature lovers are loth to lose. The fens of Cambridge and the marshes of Oxford are rapidly diminishing, and in the latter county, indeed, almost cease to exist. In Huntingdonshire the drainage of Whittlesey Mere brought a large area of richly productive corn land into being, but it destroyed in its only haunt the large copper butterfly, which Lord Lilford told me as a boy he had seen there in great quantity, but of which now a dried specimen will fetch several pounds. To this cause also is due the disappearance from Cambridge of the rare fen ragwort, and from Oxford of the water germander, which Turner, writing in the sixteenth century (1568), says, "groweth in Oxford and Cambridge in good plenty," whilst even the sundew, the *Equisetum sylvatictum*, and the spider orchid have been extirpated. So, too, near Peterborough a large tract is now sunny cornfields where the waves of wheat ripple, which were not long ago morasses on which the cotton-grass waved its snowy plumes.

Therefore it is most desirable to conserve for national purposes small isolated areas of fen, moor, bog, or woodland which cultivation has not soiled, and in which true native species grow. These should be kept for nature to work her own sweet will, and into which no alien element should be intentionally introduced. London has wisely purchased Burnham Beeches, but, with an excess of zeal, is gradually altering it into a colourless Battersea Park, with its formal drives, planted shrubs, and other abominations. Why could it not have been left alone? It was so beautiful. Oxford has, through the kindness of my late friend, Mr. Henry Willett, of Brighton, a few acres of delightful woodland and marsh (now known as the Ruskin Reserve), which he presented and which is kept rigorously untouched. There a rich variety of marsh and sylvan species abound. Cambridge has also the advantages of Mr. Verrall's

acquisition of a part of Wicken Fen, where the swallow-tail butterfly is plentiful, and its food plant, *Peucedanum palustre*, grows with the marsh pea, *Lathyrus palustris*, the sweet gale, *Myrica gale*, and many other rare and local species of plant and insect. He has reintroduced the copper butterfly, and it will be especially interesting to see if the characters by which it differed from the English form become in time modified by its surroundings.

Quite recently Mr. Charles Rothschild has purchased a portion of fenland near Wood Walton, which is also to be preserved as one of nature's sanctuaries, in which animal, bird, insect, and plant life will remain secure. Like the Ruskin Reserve, this has considerable scenic beauty, and it possesses two species of peculiar interest, since they have only recently been added to the British flora by Mr. Hunnybun of Huntingdon, who is preparing a most beautiful series of drawings of British plants, which I believe he intends to present to this University. Two years ago I visited it with him to see those rare plants, one a violet bearing the inappropriate name *Viola montana*, L., a tall species, 9–12 inches high, of upright habit and conspicuous flowers; the other, a wood-rush, *Juncoides pallescens* (Bess.). This latter has recently been found in Surrey. With these grew the rare fen violet, *V. stagnina*, and the commoner heath violet, *V. canina*, L. These three species hybridize in a most perplexing manner. We also on this occasion found a hybrid between the two bedstraws, *Galium erectum* × *verum*, showing all gradations. Here also grows the reed-grass, *Calamagrostis canescens*, Druce; the sedge, *Carex dederi*, Retz, the pink *Dianthus Armeria*, *L.*, and many other species. This paradise, like another of earlier date, is not without its serpent, but, to be correct, the plural must be used. Never have I seen the viper so abundant as on that hot summer day; there they were sunning themselves on the drier and barer portions of the fen, or in the more grassy places their continuous rustle greeted every foot-fall.

The insect life is remarkably rich, the purple emperor, the marbled white, several fritillaries, the Duke of Burgundy, two or three species of blues, and two hair-streaks, one the very rare and local black hair-streak, indeed, being first made known as a British insect from the vicinity. Therefore Cambridge can indeed be congratulated on having two such spots as Wicken and Wood Walton Fen in its neighbourhood, and in also having

two such able, rich, and generous naturalists as Mr. Verrall, a well-known authority not only on larger animals, but on the minute midges (would he could reduce the number of individuals); and Mr. Rothschild, who is such a devoted lover of nature, and who has made a bird paradise in his Northamptonshire home, and who is a recognized expert in a branch of the animal kingdom even less popular and more lively than midges. May the acres owned by these gentlemen be preserved for all time as accessible spots to those who wish to study from the greatest volume yet produced—the book of nature, which the wisest knows but in part! Perhaps the members of this Conference may in their own districts induce others to follow such excellent examples.

EXHIBIT RELATING TO JOHN RAY: WITH A BRIEF SKETCH OF HIS LIFE AND WORK'

By G. Claridge Druce, M.A., F.L.S.

Cambridge has the honour of having as one of its alumni the founder of British botany, Wm. Turner, the author of *A New Herball*, one of the Reformers who graduated from Trinity about 1530, and who, it is said, married the daughter of a Cambridge alderman, but in the seventeenth century a still more brilliant naturalist, John Ray, or, as he then spelled his name, Wray, on June 28, 1644, entered St. Catherine's Hall. He was the son of Roger Ray, of Black Notley, in Essex. Two years later he migrated to Trinity College, and in 1649 was chosen Junior Fellow. In 1651 he took his Master of Arts, and became a Senior Fellow of the College. He then made a friend of the celebrated Isaac Barrow, and became the tutor of Mr. Francis Willughby, of Middleton Hall, who had the same love for natural science as Ray, and who became not only his patron, but also his intimate friend and fellow traveller. His name appears with that of Ray on a paper dated July 23, 1659, which I purchased with some other autographs from the late Mr. W. Pamplin. I thought that any relic of the distinguished philosopher might be interesting to exhibit at this Cambridge meeting. With it is a list of plants found growing about Cambridge by Mr. Corbyn, see p. 451 (a name not unfamiliar to pharmacists), although I do not know if there is any connexion between the Cambridge student and the chemists and apothecaries of the same name. This list is dated 1656 and 1657, and therefore three or four years earlier than Ray's first publication, which was a small duodecimo volume of 182 pages, printed at Cambridge, entitled *Catalogus Plantarum*

circa Cantabrigiam Nascentium. Previously to this Ray had visited several parts of England and Wales between August 19 and September 18, 1658, his journey taking him through the counties of Northampton, Warwick, Lincoln, Leicester, Derby, Lancaster, Chester, Salop, Worcester, and Gloucester, besides four Welsh counties. In 1661, with Mr. Willughby, he travelled through Huntingdonshire, Northamptonshire, Yorkshire, Durham, and Northumberland, returning through Westmoreland and Cumberland.

In 1662, during the month of May, with Mr. Willughby, he visited the south-west of England, passing through Devon and Cornwall, and taking the counties of Dorset, Wilts, and Hants on his way back in July. In the same year he was deprived of his fellowship for refusing to sign the declaration against the Solemn League and Covenant. From 1663 to 1665 he was travelling abroad with Mr. Willughby, and in 1667 he again travelled through the western counties to Devon and Cornwall. In 1668 he visited his friend Mr. Courthope at Danny in Sussex, whose name also appears on the exhibit. In 1670 he published his first work on the general flora of Britain under the title of *Catalogus Plantarum Angliæ*, 1670, an octavo volume of 358 pages, and enumerates about 1,050 species of plants. A smaller number than that given by How in the *Phytologia* of 1650, which contains 1,200 species, or by Merrett in his *Pinax* of 1666, in which more than 1,400 are enumerated; but Ray has been much more careful in selecting undoubted natives, and in avoiding the introduction of mere forms or varieties. In 1673 he married a daughter of John Oakley, of Launton, on the border of Oxfordshire. In 1682 appeared his *Methodus Plantarum Nova*, an octavo of 166 pages, which contains a natural arrangement of plants based chiefly on the characters of the fruit, but he still adheres to the ancient division of the vegetable kingdom into trees, shrubs, and herbarium plants. This work foreshadowed his *magnum opus*, the important *Historia Plantarum*, in two folio volumes, one of 984, the other of 985 pages, which appeared in 1686 and 1688. In this admirable work Ray has everywhere distinguished British from exotic plants, and has given the place of growth and time of flowering. 6,900 plants are described. In 1688 he also issued his *Fasciculum Stirpium Britannicarum*, an octavo volume in which several new British plants from Wales and Cornwall are given. In 1690 appeared the *Synopsis Methodica Stirpium Britannicarum*, a small octavo volume of 317 pages, dedicated to Thomas, son of his old friend Francis Willughby. This book was so much in advance of previous works that it became the pocket companion of every British botanist.

In 1690 he supplied to Gibson the provincial catalogues of plants which appeared in Camden's *Britannia*.

In 1696 he issued a second edition of the *Synopsis*, but the numerous additions, nearly 100 in number, were chiefly due to auxiliaries, Ray's advancing years and infirmities necessarily curtailing his field work. In 1704 a third volume of the *Historia* appeared. He died at the age of seventy-eight at Black Notley, on January 17, 1705, and a monument is erected there to his memory. Not that such was needed; as long as botany is studied his name will be revered; his zeal and enthusiasm stimulated the study of his favourite science (for he knew much also of the animal kingdom) throughout Britain, and I have no doubt led to his great rival, Morison, of Oxford (whose biography and herbarium Professor Vines and myself are now preparing), to issue his system as finally adumbrated in the great work *Plantarum Historia Universalium Oxonienis*, which was published in 1680. This is not the place to make comparisons, but there is no doubt that in Ray we had one of the greatest students of botany which Britain has produced, and whose labours and example have done so much, not only for his own time but for succeeding ages. His European herbarium and letters are in the British Museum, and there is a portrait and bust of him at Trinity College, Cambridge. Linnaeus perpetuated his name in the plant genus *Rajania*, and a genus in ichthyology is also called *Raia*. Many of the stuffed animals, etc., which were collected by Ray and Willughby were preserved until comparatively recent times at Wollaton Hall, near Nottingham, but they are now destroyed, as I found out from one of our *confrères* when the Conference met at Nottingham.

I also exhibit a copy of the first edition of the *Synopsis*, which was purchased at Dr. Sibthorp's sale, and is said to have belonged to the Oxford Professor of Botany, Dillenius, who edited the third edition of Ray's *Synopsis*.

The historian says: "Mr. Ray was a man of excellent natural Parts, and had a singular vivacity in his Style, whether he wrote in English or Latin, which was equally easy to him. In a word, in his Dealings, no man more strictly just; in his Conversation no man more humble, courteous, and affable; towards God, no man more devout; and towards the Poor and Distressed no man more compassionate and charitable according to his abilities."

Discussion

The PRESIDENT thought that Mr. Druce's papers were always welcome to the Conference. It might not be known to all the

members that Mr. Druce's paper at the Dundee Conference had initiated a movement to erect a memorial to that eminent botanist, Don, which Mr. Druce was going to unveil in a few weeks' time.

Mr. RUTHERFORD HILL said that nearly a hundred years ago the minister of the parish of Selkirk induced the Duke of Buccleuch to fence off a portion of Ettrick River Valley, the site of the famous Ettrick Forest, to be reserved in the manner mentioned by Mr. Druce. Perhaps in one of his numerous visits to Scotland Mr. Druce might be induced to turn his steps in the direction of Ettrick Valley, and give them an account of the changes consequent on leaving this place untouched for a hundred years.

Mr. SAVILLE PECK remarked that when Mr. Druce visited him about a month ago he asked him whether he would read a paper at the Conference. Mr. Druce replied that he had nothing, but mentioned that he had one or two notes in hand which might interest the Conference. They promptly sat down and wrote out the titles of these notes. He thought that they would agree with him in saying that he was quite justified in pressing for these papers. (Hear, hear.) As a local man he felt he must thank Mr. Druce heartily for drawing attention to the fact that so near to Cambridge they had a delightful paradise for botanists on what had been fen land. With regard to Mr. Druce's second paper, he was not quite sure whether it was generally known that there was a club or society which met for the purpose of discussing John Ray's works. Several weeks ago, when he was speaking to Mr. John Willis Clarke, the Registrar of the University, who had hoped at one time that he would have been able to give one of his famous lectures on Cambridge history, but was prevented by the state of his health, he saw in his library a notice of the meetings of the John Ray Club. He (the speaker) mentioned to Dr. Clarke that they were going to have a paper on John Ray at the Conference, and Dr. Clarke seemed to regret that the old manuscript with Ray's autograph was not in Trinity Library.

Mr. CLARIDGE DRUCE, in reply, thanked the Conference for the attention with which they had listened to his remarks. He was not certain that these papers were entirely foreign to the business of the Conference, as pharmacists could do so much to observe the old traditions of the apothecary, and now that botany was practically excluded from the medical curriculum it rested with pharmacists to carry on the old traditions. He was very grateful to Mr. Peck for his kind remarks, and as

far as the manuscript was concerned, if Trinity College wanted it, when he died they should have it.

Thanks were accorded to Mr. Druce for his papers.

PHOSPHORIC ACID AND AMMONIUM PHOSPHATE

By T. E. Wallis, B.Sc., F.I.C., Ph.C.

Phosphoric Acid

The ready fusibility of lead monoxide when heated makes the preparation of a dry and powdered specimen by the ignition of pure lead peroxide a somewhat tedious process, and the ease with which the fused oxide attacks the glaze of a porcelain crucible results in the sacrifice of a crucible for almost every determination of phosphoric acid by the method given in the British Pharmacopœia. Since the method is very simple and direct, it seems desirable to retain some such method rather than to introduce one of the volumetric processes, which in the case of phosphoric acid are not very satisfactory.

The difficulties attendant upon the use of the official process result from the employment of a lead salt, and to effect an improvement one naturally looks for another oxide that is itself infusible, and whose phosphate is also infusible. The ordinary gravimetric method for the determination of phosphates by means of magnesia mixture directs one's attention to magnesium oxide as a suitable substitute for lead oxide, and as the following experiments show, heavy magnesium oxide has proved to be a very satisfactory substance to use for the assay of phosphoric acid.

In the case of a dilute acid, the acid is simply added to a weighed quantity of recently ignited heavy magnesium oxide in a crucible and evaporated to dryness on a water-bath; the residue is then ignited over a Bunsen burner; the increase in weight gives the amount of phosphoric anhydride in the amount of phosphoric acid used.

For a concentrated acid it is preferable to use the acid without dilution, as by so doing much time is saved, and the use of a water-bath becomes unnecessary. To make an experiment a weighed quantity of acid is put into a crucible and an approximately equal weight of recently ignited magnesium oxide is added. The whole is heated cautiously over a Bunsen burner and finally ignited strongly, cooled, and weighed. In adding the oxide to the concentrated acid much heat is evolved, and care must be taken to add the powder in very small quantities at first, or some is likely to be carried away by the steam formed during the action. The violence of the action also prevents one

from obtaining the weight of added oxide by making a second weighing of the crucible containing the acid; one must therefore find the amount used by having the oxide in a second crucible, which is weighed before and after transferring the required quantity to the crucible with the acid.

It is important to add the oxide to the acid, because unless an unnecessary and unwieldy excess of oxide is used it is difficult to ensure a thorough mixing of the two, and some acid is lost by volatilization. Although a weight of oxide equal to the weight of concentrated acid used is considerably in excess of the amount required by theory, it is necessary to use this quantity so that the acid may be well covered; if a smaller quantity is used loss of acid by volatilization may result.

The crucibles used for this process are easily cleaned, and can be used an indefinite number of times. The following results demonstrate the reliabilty of the method. The amount of phosphoric acid in three specimens was determined both by precipitation with magnesia mixture and by the method suggested in this paper.

EXPERIMENTS, USING MAGNESIA MIXTURE

Acid used.	Amount taken.	Weight of $Mg_2P_2O_7$.	H_3PO_4 indicated.	Percentage of H_3PO_4.
A dilute Solution	10 c.c.	0·398	0·3505	3·5 Gm. in 100 c.c.
Phosphoric Acid, sp. gr. 1·5; B.P.	0·854	0·644	0·5671	66·4
Phosphoric Acid, sp. gr. 1·75 .	0·685	0·707	0·6226	90·9

EXPERIMENTS, USING MAGNESIUM OXIDE

Acid used.	Amount taken.	Weight of P_2O_5.	H_3PO_4 indicated.	Percentage of H_3PO_4.
A dilute Solution	10 c.c.	0·253	0·3491	3·49 Gm. in 100 c.c.
Phosphoric Acid, sp. gr. 1·5; B.P.	0·474	0·228	0·3146	66·37
Phosphoric Acid	0·418	0·275	0·3795	90·8

AMMONIUM PHOSPHATE

The fact that the action of heat upon ammonium phosphate results in the evolution of ammonia, and the production of a residue consisting of phosphoric acid suggests that the method used for phosphoric acid should be applicable to ammonium phosphate. The process is entirely satisfactory, and can be carried out very rapidly, as follows:—

Weigh into a crucible about 0·4 to 0·5 Gm. of powdered ammonium phosphate, and add about an equal weight of recently ignited magnesium oxide; mix gently with a platinum wire, and see that the phosphate is well covered by the oxide. Heat the mixture cautiously until there is no further visible action, and finally ignite strongly over a Bunsen burner, cool and weigh. The increase in weight of the crucible and magnesium oxide gives the amount of phosphoric anhydride present in the ammonium phosphate taken. Four commercial specimens were examined, and the results are tabulated below :—

EXPERIMENTS, USING MAGNESIA MIXTURE

Specimen	Quantity taken	Weight of $Mg_2P_2O_7$	H_3PO_4 indicated.	Percentage of H_3PO_4	Percentage of $(NH_4)_2HPO_4$
A	0·4767	0·421	0·3709	77·8	104·8
B	(1) 0·4391	0·396	0·3487	79·41	106·9
	(2) 0·413	0·372	0·3276	79·3	106·8

Specimens C and D were not assayed by this method.

EXPERIMENTS MADE WITH MAGNESIUM OXIDE

Specimen.	Quantity taken	Weight of P_2O_5	H_3PO_4 indicated	Percentage of H_3PO_4.	Percentage of $(NH_4)_2HPO_4$.
A	(1) 0·425	0·238	0·3285	77·3	104·2
	(2) 0·482	0·271	0·3740	77·6	104·55
	(3) 0·447	0·251	0·3464	77·5	104·4
B	(1) 0·395	0·227	0·3133	79·3	106·8
	(2) 0·4391	0·252	0·3478	79·2	106·7
C	0·415	0·239	0·3299	79·5	107·1
D	0·388	0·220	0·3036	78·25	105·4

These results show that the method is reliable, and they also emphasize the fact noted by Greenish and Smith (*Pharmaceutical Journal* [4], **12**, 774) that commercial ammonium phosphate is not represented by the formula $(NH_4)_2HPO_4$, and does not correspond to the official requirements. The same fact was confirmed by Squire and Caines, and more recently by Dallimore (*Pharmaceutical Journal* [4], **29**, 69). It was also shown by Squire and Caines and confirmed by Greenish and Smith (*Pharmaceutical Journal* [4], **17**, 947) that it is quite a simple matter to prepare ammonium phosphate of the Pharmacopœia standard.

Since during the last seven years there appears to have been no improvement in the quality of commercial ammonium phos-

phate, I prepared a specimen of the Pharmacopœia salt with a view to finding some simple test that would exclude the unsatisfactory commercial article. The crystals obtained showed a purity of 99·65 per cent. of di-ammonium phosphate, and did not redden blue litmus paper.

The reaction of litmus to ammonium phosphate is rather indefinite; all the commercial samples reddened blue litmus when a small crystal was placed on the paper and a drop of water added, and they all of them also gave under similar conditions a blue colour with red litmus paper; the specimen made in the laboratory differed in that while it gave a blue colour with red litmus it did not redden blue litmus paper. I notice also that Squire and Caines tested some of their specimens with litmus, and that where the action is recorded acidity was indicated except in the case of one specimen (No. 6), which also responded to the Pharmacopœia requirements by showing a purity of 100 per cent. of di-ammonium phosphate; these results are in agreement with my own, and I would suggest that an addition to the Pharmacopœia monograph of a sentence to the effect that "ammonium phosphate does not redden blue litmus paper" should be made, as this test would exclude most of the faulty commercial samples.

The conclusions arrived at in the course of this work may be summarized as follows:—

(1) The official process for the assay of phosphoric acid might be improved by substituting magnesium oxide for the lead oxide at present used.

(2) The purity of ammonium phosphate can be rapidly and correctly determined by ignition with magnesium oxide, and this method might replace the more tedious official process of precipitation by magnesia mixture.

(3) Di-ammonium phosphate of the purity demanded by the Pharmacopœia can be prepared. It does not redden blue litmus paper, and the inclusion in the Pharmacopœia of a statement to that effect would exclude many commercial samples deficient in ammonia.

Discussion

Mr. Thomas Tyrer thought this was a very practical paper. He personally thought it was about time to correct the B.P. in such tests as these. A point had been made about stringency in some methods and laxity in others, and, speaking as a manufacturer, he said he would rather have stringency than laxity,

so that those who conformed had some chance of being rewarded according to their merits.

Mr. EDMUND WHITE thanked Mr. Wallis for bringing forward this process, which he thought was one worthy of trial. He would like to ask him whether he considered the figures he gave for the percentage of $(NH_4)_2HPO_4$ indicated that the salt examined contained too much acid.—[Mr. WALLIS : No. 7] —Mr. Tyrer had already explained this by the disappearance of ammonia. As to the several phosphates, there appeared to be some confusion as to which phosphate was required when the acid phosphate was asked for. Another question he would like to ask was whether the samples Mr. Wallis prepared and mentioned in the paper were a first crop of crystals. His friend Mr. Tyrer would agree with him that there was a vast difference in preparing this salt experimentally and on the large scale. In the latter way, when crystallizing from an acid bath and when certain crops had been taken out, the acid increased, and it was necessary to put back the alkali radicle. Were the samples Mr. Wallis examined, besides what he himself prepared, commercial specimens or not?

Mr. E. F. HARRISON thought that this test was not altogether suitable as it stood; it assumed that nothing else was present which could be fixed except magnesium oxide. If, for example, calcium sulphate were present, the result obtained would be vitiated. If it is required as an indication of purity, it could only be so after the application of qualitative tests. Mr. Harrison also referred to a test mentioned to him in a letter by Mr. A. G. Tingle, an analyst, located on a Pacific island, where he conducted an enormous number of phosphate analyses, who had communicated to him (the speaker) his process, which was very rapid and accurate. It consisted in dissolving up the sample in diluted nitric acid, then nearly neutralizing with ammonia, and precipitating the phosphate with a known excess of normal silver nitrate, filtering off an aliquot part, and titrating the filtrate with potassium thiocyanate, using ferric sulphate as an indicator.

Mr. ALCOCK also emphasized the remarks of Mr. Harrison, for he had met a sample of phosphoric acid which gave a copious precipitate with ammonia, and proved to be aluminium phosphate, which no doubt had been derived from a porcelain dish, in which the acid had been wrongly evaporated for the purpose of concentration. It was therefore very desirable to ensure absence of these and other impurities before proceding to the quantitative method. Referring to Mr. Tyrer's choice of the

ammonium magnesium precipitate method, the difficulty was that workers were not agreed as to the strength of the ammonia wash water, for many strengths were given, and from experience it was found that all strengths of ammonia more or less dissolved some of the precipitate during the process of washing. It should be noted that a set of rules had been laid down in this connexion by the Board of Agriculture in the official analyses of phosphates in manures, food-stuffs, etc. Whilst referring to this qualitative testing, the B.P. in the appendix tells what the tests are for this or that, but does not direct how the solution shall be prepared for the testing, which was certainly most important. As an illustration, under the head of tartrates, where Fenton's test was described. Now if one attempts to perform this test with, say, tartar emetic, his experience was that it did not succeed at all.

Mr. WALLIS, in reply, said that he quite agreed with the remark as to making the qualitative test first. He had assumed that that would have been done before the quantitative test was carried out. In reply to Mr. White, as to the sample used, two were bought as B.P. samples and two were obtained from good chemical firms; he might also add that his were first crop crystals. He would like to state that when an aqueous solution of ammonium phosphate was heated, as it became even warm, ammonia was perceived coming off rapidly, and ultimately no doubt the di-hydrogen phosphate remained.

A vote of thanks was passed to Mr. Wallis for his paper.

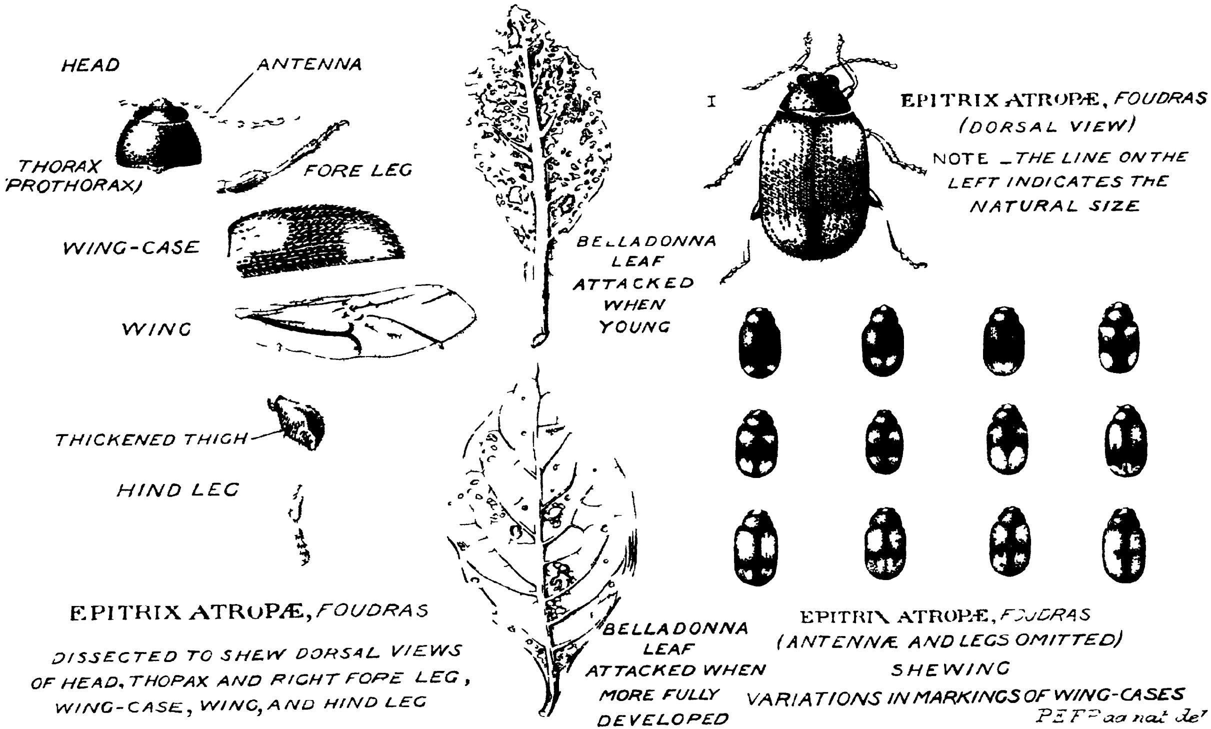
AN INSECT PEST IN BELLADONNA

BY P. É. F. PERRÉDÈS

The insect forming the subject of this paper has made its appearance in the belladonna plants on the farm of Messrs. W. Ransom and Son in the vicinity of Hitchin, Hertfordshire, during the past few years, being especially prevalent in dry seasons, when it causes considerable damage to the plants. During the present year its attacks have, so far, been chiefly limited to a field of belladonna plants surrounded by trees. Specimens of these insects were submitted by Messrs. W. Ransom and Son to the Board of Agriculture and Fisheries in May of this year, and they were identified by the Board as *Epitrix atropae*, Foudras.

Epitrix atropae, Foudras (see Plate I.), is a small beetle belonging to the tribe Halticae (flea-beetles), of the series *Phytophaga*, or plant-devourers.[1] The members of the tribe are

[1] See also *The Cambridge Natural History*, vol. vi. London: 1899, p. 278.



Figures illustrating an Insect Pest in Belladonna (*Epitrix atropæ*, Foudras)

Note —The wing in the figure of the dissected insect is slightly diagrammatic

particularly distinguished by the thickened thighs of the hind-legs, which are formed for leaping, and have caused the name of "flea-beetles" to be applied to them.

In Canon Fowler's work on the *Coleoptera of the British Islands*,[1] to which the reader is referred for a systematic account of these insects, it is stated that of the fifty-two species described as belonging to the genus *Epitrix* only three are European. Two of these, viz., *E. pubescens*, Koch, and *E. atropae*, Foudr., are British. *E. pubescens*, which is found on *Solanum Dulcamara*, L., ranges from 1·5 to 1·75 mm. in length, and its upper surface is uniformly black in colour. *E. atropae*, which has also been regarded as a variety of the preceding, is chiefly distinguished from the latter by its smaller size (length 1·3 to 1·5 mm.) and by the presence of reddish-yellow patches on the wing-cases. These are very variable, and may be almost obliterated, or, on the other hand, so much extended as to cover nearly the whole area of the wing-cases (see figures of these variations in Plate I).

Epitrix atropae, Foudras, does not appear hitherto to have been specifically referred to as a pest in cultivated belladonna plants, although the small beetle of the turnip-flea family referred to by Mr. E. M. Holmes, in his Museum Report for 1907-10 as riddling belladonna plants, is probably the same.[2] The distribution of the insect is given by Canon Fowler as follows:—"Chalky places; on *Atropa Belladonna*; very local, but in profusion where it occurs; Mickleham, Caterham, Headley Lane; Cotswold Hills (Blatch); Arundel Park, where I once found it abundantly on September 5, 1879; Portsdown Hill, near Portsmouth (Moncreaff).[3]

The only instance mentioned by Canon Fowler of a member of the genus occurring as a pest is that of a species which was brought before the Entomological Society at the meeting held June 6, 1888, as doing considerable damage to young egg-plants and tobacco-plants (both belonging to the N.O. Solanaceae) in the island of Trinidad.[4]

The larval and pupal stages of the genus *Epitrix* do not appear to have been studied, but other members of the Halticae, which have been studied and described in detail, are, although similar

[1] *The Coleoptera of the British Islands*, by the Rev. Canon (W. W.) Fowler, M.A., F.L.S., vol. iv. London: 1889–1890, p. 384, and plate 140, Figs. 6 to 8.

[2] *Museum Report: A Series of Notes on Donations to the Museum and Herbarium during the Years* 1907–10. Compiled by E. M. Holmes, F.L.S., Curator of the Museum, Pharmaceutical Society of Great Britain, London, 1910, p. 53. ("The Cultivation of Medicinal Plants in Huntingdonshire.")

[3] Fowler, *loc. cit.*, p. 385.

[4] Fowler, *loc. cit.*, p. 384.

in most respects, stated to belong to one of two types.[1] In the first of these (e.g., *Haltica oleracea*, Linné (the cabbage flea), the beetle deposits its eggs on the surface of the leaf, and the young larvae feed on the outside of the leaves. When about to change into a pupa they usually fix themselves by their anal segments to the under side of the leaves, or occasionally bury themselves in the earth. In the second case (e.g., *Phyllotreta nemorum*, Linn.,[2] the turnip-fly or flea-beetle), the eggs are deposited under the epidermis of the leaf, and the larvae form galleries beneath the surface and undergo their changes in these galleries. As I have observed no galleries in the case of *Epitrix atropæ*, the latter would seem to belong to the first type mentioned above. In other respects the ravages caused by this insect in belladonna seem to be identical with those of the turnip-fly in turnips, and the remedial measures which have been found effective in the latter would also apply in the former.

When the plants do not grow vigorously in their early stages they are unable to keep pace with the attacks of the beetles, and the result is an extensive destruction of the parenchymatous tissue of the leaves, as shown in the upper figure of a belladonna leaf in Plate I, or in the photograph of the plant reproduced in Plate II. If the plant is robust it will to a very considerable extent outgrow the damage done to it, although bearing evidences of the beetle attacks (see Plate III and lower figure of belladonna leaf in Plate I).

Among the remedies which have been suggested for the eradication of turnip-fly[3] the following may be selected as being likewise applicable to *Epitrix atropæ* :—

1. Good tilth. "Good results have frequently attended working the land in autumn ; and, in spring, sowing on a 'stale' furrow."
2. "Judicious manuring to force growth."
3. Rolling the drills after sowing the seed.
4. Using fresh seed, and sowing thickly.

[1] See F. Chapuis et E. Candèze, "Catalogue des Larves des Coléoptères," in *Mémoires de la Société Royale des Sciences de Liége*. Tome Huitième, Liége, 1853, p. 606. Cited in Fowler, *loc. cit.*, p. 332.

[2] According to Somerville (*Farm and Garden Insects*, London, 1897, p. 70) the "Turnip-fly" in many—perhaps most ?—parts of the country is not *P. nemorum* but *P. undulata*, Kutschera, the latter resembling the former in nearly every respect, but from which it is distinguished by its smaller size and nearly black legs. See also Board of Agriculture and Fisheries Leaflet 3, p. 3, and Fowler, *loc. cit.*, p. 366.

[3] See Board of Agriculture and Fisheries Leaflet, No. 3, pp. 3 and 4 ; Ormerod, Eleanor A., *A Text-Book of Agricultural Entomology*, Second Edition, London, 1892, pp. 116–119 ; and *A Manual of Injurious Insects with Methods of Prevention and Remedy*, London (1881), pp. 145–153 ; Somerville, William, *Farm and Garden Insects*, London, 1897, pp. 69–71.

Belladonna plant attacked by *Epitrix atropæ*, Foudras.

Reduced Height of original 23 inches

Belladonna plant which has largely outgrown the attacks of *Epitrix atropæ* Foudras
Reduced Height of original 34 inches

5. Dusting with lime, soot, road-dust, and, especially, gas-lime.

6. Spraying with soap and paraffin emulsion.

7. Watering with pure water or liquid manure early in the morning or late at night.

Pushing among the plants a light framework on wheels, carrying boards of which the under surfaces have been freshly tarred to catch the leaping insects as the framework is wheeled along.

The last is the method particularly recommended by the Board of Agriculture and Fisheries.

The chief features to be noted in identifying the insect, going from the more general to the more particular, may be summarized as follows (see figures in Plate I):—

Feet apparently four-jointed; thighs of hind-legs much thickened; wing-cases punctured in rows; antennæ eleven jointed; wing-cases set with distinct rows of hairs; thighs dark in colour; wing-cases black, but with reddish-yellow spots; small size.

I desire in conclusion to record my thanks to Mr. E. M. Holmes, F.L.S., F.E.S. Mr. A. W. Kappel, F.L.S., F.E.S., and Mr. F. Ransom, F.C.S., for kind assistance in the preparation of this paper.

Discussion

Mr. Harold Deane said that last year one of the fields of belladonna grown by Messrs. Stafford Allen and Sons was attacked by an insect that was evidently the same as that described by Mr. Perrédès. Some plants were so badly attacked that they were killed. That crop had been dug up, and this year the insects had not appeared. Specimens were sent to the Chelmsford Technical Laboratories, and were identified as belonging to the Halticae, but they did not identify the species. The fact that a crop of kohl-rabi next to the belladonna was not attacked was a puzzle when it was believed that the insect was a turnip-flea beetle, but if it were this species which attacks belladonna only, this was only to be expected. With regard to the remedies suggested, paraffin and soap emulsion was effective. As an experiment, a few plants were sprayed with Paris green and with lead arsenate, but this was quite ineffective. Whether this were due to the beetles being immune to arsenic, as they are to atropine, or whether they refused to eat it, he could not say.

He asked whether Mr. Perrédès could explain how these insects became distributed. Belladonna is rare in England as a wild plant, and so far as he was aware none grew near this crop, and it was difficult to believe that such a small insect could fly the long distances between the spots where belladonna was grown.

Mr. PERRÉDÈS, in replying, said that the question of distribution was a very interesting one; it was of interest to note that the insect was apparently so rare that Canon Fowler had thought it extraordinary enough to record. The growth in number was little short of miraculous. At one moment they might be a curiosity. Then there was some change of conditions either of weather or soil which enabled them to have several generations in one season and to multiply to such an extent that they decame a pest. The explanation was to be found in its extreme capacity for reproduction. Mr. Deane's observations were very welcome, as it had been suggested that turnips might serve as host to this particular insect, but Mr. Deane had shown that this was not the case.

Mr. MARTIN said it was of interest to note that Mr. Harold Deane, who had just spoken, was the grandson of the first President of the British Pharmaceutical Conference. He did not know whether that was Mr. Deane's first speech at the Conference, but if so he hoped they would have more contributions from him (hear, hear).

Thanks were passed to the author for his paper.

ASAFETIDA

BY JOHN C. UMNEY, F.C.S., AND SIDNEY W. BUNKER

We feel that we almost owe an apology to the members for once again bringing forward this somewhat unsavoury subject, but we do so in an attempt to answer question No. 4 in the "British Pharmaceutical Conference Research List": "What is the percentage of essential oil in the different varieties of asafetida?" This question has been in the list since 1908, and previously in 1903, 1904, 1905 information was asked in respect to the botanical source. Both appear to us to be of some importance as bearing on the difficulty that has arisen in framing monographs for asafetida for British and other pharmacopœias, and making them, if possible, in accord with the drug as met with in commerce. It

will be remembered that shortly after the publication of the British Pharmacopœia of 1898 there was much controversy as to the possibility or otherwise of obtaining in commerce asafetida answering the official requirements, and the following points abstracted from a paper by one of us at that time indicate practically what was obtainable in commerce at that time, representing both the very highest quality of asafetida (no matter what price was paid for it) and other commercial grades :—

	Per cent.
Ash of picked tears	$3\frac{1}{2}$ to 6
Solubility of same in 90 per cent. alcohol . . .	50 to 70
Ash of tears, finest, as imported	14 to 25
Solubility of tears, finest, as imported, in 90 per cent. alcohol	40 to 50
Ash of fair mass	35 to 60
Solubility	20 to 40

The same difficulty arose in the United States following the publication of the United States Pharmacopœia of 1904, the standard required being 50 per cent. solubility in 90 per cent. alcohol and 10 per cent. ash. The matter was fully reported upon by Lloyd, who stated that no asafetida was obtainable in the United States even approximating to the requirements of their pharmacopœia, his figures being as under :—

Ash, 16–20 per cent. of fair commercial asafetida.
Ash, 1·78–2·55 per cent. in selected tears yielding 76 per cent. to alcohol.
Acid No., 61·9–68·8 per cent. for dry tears.
Acid No., 37·7–40·4 per cent. for mass.

The recognition of the U.S.P. as the standard under the U.S. National Foods and Drugs Act, 1906, led to a modification of the pharmacopœial requirements, which were subsequently altered to allow the drug to have 15 per cent. of ash instead of 10 per cent.

The majority of workers on asafetida in recent years have recommended its use in a purified condition, using an approved solvent for the separation of the soluble portions from impurities and the subsequent removal of the solvent by distillation. This, however, is not by any means an easy or satisfactory process, for a portion of the volatile oil of asafetida must of necessity be lost in the removal of any solvent which would be commercially employed.

It is this difficulty that brings us to the question which is really the starting point of this inquiry : What is the percentage of volatile oil in asafetida ? Is not the point of most serious importance in view of the therapeutic value of the drug being ascribed to the

oil, and is the oil of the tears of asafetida identical with that contained in the mass asafetida?

We have consulted most of the recognized British works of reference on therapeutics with regard to asafetida, and there appears to be a general opinion that the volatile oil (or, at any rate, volatile constituents) are those which are of value. The following are the views stated in these works:—

Codex.—"It is employed generally in hysterical and allied conditions to produce a subjective effect through its unpleasant taste and smell."

Mitchell Bruce.—"It possesses the actions of other volatile oils and resins upon the alimentary canal . . . It is extremely disagreeable. The mental influence of this nauseous impression, added to the other stimulant effects on the mouth and stomach, constitutes a powerful nervine stimulant, which arrests the emotional disturbance, muscular spasms, and other morbid nervous disorders of hysteria. The stimulant action of volatile oils on the bowel is specially marked, and an enema of asafetida may be employed to expel flatulence, relieve constipation, and arrest convulsions." "The volatile oil of asafetida passes through the blood and tissues, and is excreted in the urine, sweat, breath, and discharge from wounds. Thus remotely it exerts the usual stimulant action of volatile oils, and is sometimes given as a stimulant and disinfectant expectorant in chronic bronchitis."

Hale White.—"Asafetida, in virtue of its volatile oil, acts like volatile oils generally. Its action as a stimulant to the intestinal muscle is especially well marked, hence it is combined with aloes in Pil. Aloes et A., and the enema of it will relieve flatus. Its taste is credited with some mental effect in cases of hysteria . . . it is used to control hysterical . . . disturbance, but it often fails."

Whitla.—"Active principle is an ethereal oil." "It is in hysterical ailments that it is chiefly employed, controlling the irregular and erratic nervous phenomena seen in that disease, as some suppose by the moral influence of its disgusting and intolerable odour. It acts as a mild purgative, and is very beneficial as an enema in flatulent colic."

Lauder Brunton.—"Asafetida . . . and other aromatic substances have an antispasmodic action which we do not understand. It is possible that they affect some part of the brain, particularly so as to increase its regulating power in much the same way as camphor. . . . Stimulants which have a powerful odour and pro-

bably act on the higher centres through the olfactory organs, either by direct application or during their elimation."

Summarizing these opinions, it would appear that the volatile oil is the valuable constituent, and we therefore decided to determine (if possible) the proportion of volatile oil present in the different types of asafetida which enter the port of London, and to make a comparison of such oils.

In handling asafetida one is naturally impressed with the idea that the two varieties as found in commerce appear to be absolutely different. Dieterich states in his work (p. 314) that both commercial varieties of asafetida are attributed by Mr. E. M. Holmes to *Ferula Narthex*, but as we were not able to find confirmation of this statement in any of the published papers by that authority, we invited him to favour us with further light on the subject. Mr. Holmes does not hold the views attributed to him by Dieterich, nor can he assign any reason for the opinion expressed. The following is the report which Mr. Holmes has kindly sent us :—

"Asafetida is described in the Pharmacopœia as obtained from the root of *Ferula foetida*, Regel, and probably other species. As a matter of fact, the only actual evidence concerning the plants that yield the asafetida of European commerce is that of Kampfer, who saw the drug collected in the Laristan province of Persia, and of Dr. J. E. T. Aitchison, who saw the product of *F. foetida* collected in Afghanistan. There are at least two distinct asafetidae in European commerce—one usually in masses, which assumes a reddish or purplish red tint, which ultimately darkens to dull dark brown—and a kind in white tears, sometimes agglomerated and often containing pieces of stone covered with the dried milky juice, and which never becomes purplish red, but after many years becomes of a pale yellowish brown (*P.J.* [3], **17,** p. 468). Dieterich is quite mistaken in saying that I attribute asafetida to *Ferula Narthex.* I presume *Ferula Narthex*, Falconer, is meant. No such statement can be found in the article on asafetida plants that I wrote in the *P.J.* [3], **19,** pp. 21, 41, 365, nor in that in *P.J.* [3], **25,** p. 131. In the former I enumerated eight species of *Ferula* that have an asafetida odour, of which only two are known, with any degree of certainty, to yield asafetida—one being *Ferula foetida*, Regel, which, so far as it is possible to ascertain from the fragments of fruits still in the British Museum, collected by Kampfer, yields the asafetida of Laristan, but whether that is the purplish-red variety of asafetida is not absolutely certain,

although it is extremely probable. Aitchison speaks of seeing a red gummy juice exuding from the cut roots, and presumably the plant was *F. foetida* (*P.J.* [3], **17**, p. 466). There is a specimen of *F. foetida*, Regel, from Dr. J. E. T. Aitchison in the Herbarium of the Society, collected in April, 1885. The other asafetida of which the botanical source has been accurately determined is the dark, nearly black, asafetida obtained from *Ferula alliacea*, which is used in India but not in this country. It is collected near Khorasan (see Dymock, *Mat. Med. W. India*, p. 316). The source of the white tears of asafetida that reach the port of London is not accurately known. It is true that the *Ferula Narthex*, Boiss, yields a white asafetida that retains its colour for years. Such variety can be seen in the Herbarium of the Pharmaceutical Society, exuded on the leaf petiole of a plant grown at Kew many years ago, and the specimen is still white, so is also a small specimen collected from the plant in Dr. Falconer's locality (Astor, in Kashmir) by Dr. J. E. T. Aitchison, F.R.S., in 1893, and this is still white. But there is nothing to connect this plant with the white asafetida of commerce. Dr. Aitchison distinctly affirmed that the people of Astor do not in any way collect the gum-resin asafetida from it, and he could not ascertain that asafetida of any sort was collected anywhere in Kashmir territory (*P.J.* [3], **25**, p. 131). There are doubtless other undescribed species besides the eight I enumerated, but although I have written over and over again to Persia during the last twenty years, I have been unable to get specimens of the plants from which the drug of commerce is collected, although I am informed that it is collected on the mountain slopes near Shiraz and between there and Ispahan. Dr. Aitchison promised to try and get the plant, as well as those producing opoponax and sagapenum, but when he arrived in India cholera was raging in Persia and so he went to Kashmir instead. I do not even know at present what province of Persia the white asafetida comes from, or whether it is collected in Afghanistan or Beluchistan, although asafetida smelling Umbelliferae grow in both these countries, but they seem more allied to *F. alliacea* in the shape of their leaves."

Dieterich states that the variety " in massa " is preferable to the other—namely, tears—for pharmaceutical purposes on account of its higher percentage of ethereal oil .

The following show the characters of the typical commercial samples upon which we have conducted these experiments :—

Mass	Tears
Ash :— 45·7 per cent.	Ash :— 17·6 per cent.
Sol. in 90 per cent. Alcohol :— 24·4 per cent. (excluding volatile matter).	Sol. in 90 per cent. Alcohol :— 44·8 per cent. (excluding volatile matter).
Sol. in 70 per cent. Alcohol :— 16·55 per cent. (excluding volatile matter).	Sol. in 70 per cent. Alcohol :— 46·4 per cent. (excluding volatile matter).
Acid No., 75·0.	Acid No., 100·3.
Ester No., 120·0.	Ester No., 119·7.
Sapon. No., 195·0.	Sapon. No., 220·0.

The acid, ester, and saponification number were obtained by the method given by Dieterich, and it will be observed that the numbers differ considerably from those obtained by Lloyd (*Pharm. Review*, xiv., 54), but agree more nearly with the values given by Squire for fine selected tears :—Acid number, 131·9; ester number, 119·3; saponification number, 251·3.

The determination of the percentage of essential oil is not by any means an easy matter, and we have used the following processes in our experiments with the drug. We think any direct estimation is impossible, and we have therefore had to depend on indirect methods, which, although not so satisfactory, yield good results :—

(1) In the first method that we used, 10 grammes of an average sample of the drug, previously broken up in a mortar, was treated with 50 c.c. of ether (sp. gr., 0·720) in a 100 c.c. Erlenmeyer flask, and allowed to stand during two days. The ether was then filtered off into a tared distilling flask. The drug was again macerated for a further twenty-four hours with another 50 c.c. of ether which, at the end of that time was filtered into the distilling flask, the residue of the drug being effectually washed with two successive portions of 15 c.c. of ether. The distilling flask was then connected to a vacuum pump, and the pressure was reduced to less than 5 cm. of mercury. At this low pressure the ether volatilized fairly rapidly, and in so doing reduced the temperature several degrees below zero, as could be seen by the coating of ice which formed on the outside of the flask. It is improbable that, at a temperature as low as this, any appreciable quantity of the oil is lost. When the ether had been completely dissipated, as shown by the melting of the ice film, the flask was rotated once or twice to ensure the last traces of ether being removed. The flask and its contents were then weighed, and the

weight of the resin soluble in ether (ferulaic asaresinotannol ester) and the volatile oil thus determined.

The distilling flask was then immersed in an oil bath, the side tube being again connected to the vacuum pump, and a current of dry air (dried by calcium chloride and sulphuric acid) was drawn through by means of a tube fitting into the neck of the flask and reaching down to within 1 cm. of its contents. The current of air was passed for three hours, during which time the temperature of the oil bath was maintained at 130–140°C. We have found that under these conditions all the volatile matter is removed at the end of that period. By weighing the distilling flask and the residue we find, by difference, the weight of the volatile matter.

The subjoined are the results obtained :—

Mass.—The sample was a very good specimen of the mass variety, having a nut-brown colour, and the appearance of containing a fair quantity of volatile oil. Ether-soluble matter, 64·05 per cent., ; loss at 130–140°C., in three hours, 15·28 per cent.

Tears.—The sample was a good commercial specimen, which obviously contained more than one variety of the drug, one kind which remained white, and a second kind which acquired a pink, almost red, colour. This was far more aromatic than the "mass" specimen. Ether-soluble matter, 60·75 per cent. ; loss at 130–140°C., in three hours, 15·69 per cent.

A second specimen of the "mass" variety, of decidedly inferior quality, gave the following figures :—Ether-soluble matter, 34·66 per cent. ; loss at 130-140°C., in three hours, 11·55 per cent.

(2) We employed in the second series of experiments the method given by Cripps and Brown for the determination of essential oil and moisture in spices and aromatic drugs (*Analyst*, 1909, 34, pp. 519-523). The moisture was determined by the method of P. V. Dupré (*Analyst*, 1906, 31, 213), which depends on the production of acetylene by the action of aqueous vapour on calcium carbide. We attempted to find the total volatile matter by drying in the water-oven. This was found, however, to be both lengthy and inaccurate. The maximum loss was attained after 171 hours' drying, after which time an increase in weight was observed, owing to the oxidation of some of the constituents of the drug. The following figures were obtained :—

Mass		Tears	
			Loss.
9 hours . . .	3·72 per cent.	9 hours . . .	6·94 per cent.
18 hours . . .	6·28 per cent.	18 hours . . .	9·12 per cent.
27 hours . . .	11·01 per cent.	27 hours . . .	10·38 per cent.
Final value (171 hrs.)	16·22 per cent.	Final value (171 hrs.)	13·85 per cent.

These figures seem to show that the tears contain more moisture than the mass, and that the tears also contain more readily oxidizable substances than the mass.

The total volatile matter was then determined by heating the drug to a temperature of 130–140°C. for three hours in a current of dry air, drawn through by a vacuum pump. A quantity of the drug was weighed into a U tube which was immersed in the oil bath, one limb being connected to $CaCl_2$ tube and sulphuric acid bottles, and the other to the pump.

This method gave the following results :—

Mass

2 Gm. mass G. asafetida gave 23·6 c.c. C_2H_2 at 0°C. and 760 mm.
=0·04071 Gm. H_2O.
=2·03 per cent. moisture.
Total volatile matter =17·93 per cent.
Volatile oil (by diff.) =15·90 per cent.

Tears

2 Gm. tears G. asafetida gave 34·1 c.c. C_2H_2 at 0°C. and 760 mm.
=0·05888 Gm. H_2O.
=2·94 per cent moisture.
Total volatile matter =17·40 per cent.
Volatile oil (by diff.) =14·56 per cent.

As might be expected, the total volatile matter is higher when determined by this method than when dried in the oven, since the effect due to oxidation is greatly diminished.

Cripps and Brown (*Analyst*, 1909, 34, pp. 519–523) found that the volatile oil was wholly removed from spices and similar bodies in about one hour, and they were of the opinion that in the substances with which they were dealing very little oxidation took place in this time. We have found, however, that for asafetida three hours are required to complete the operation, and it was thought that the passage of air for so long a time and at such a temperature would probably lead to oxidation, and so to low results for the total volatile matter. With a view to ascertaining whether or not this occurred to any appreciable extent, the process of drying the drug was conducted in a current

of nitrogen. The conditions of the experiment were identical with those of the preceding one.

We obtained the following figures :—

MASS

Total volatile matter (determined in nitrogen) = 18·20 per cent.

TEARS

Total volatile matter (determined in nitrogen) = 17·66 per cent.

From the above results we see that the difference in the total volatile matter determined in air and nitrogen is very small, amounting to about 0·3 per cent., which even in the above experiments may be accounted for by the impossibility of obtaining specimens of average uniformity.

From the above experiments we draw the conclusions that—

1. The percentage of volatile oil in the "tears" of asafetida may equal that in the "mass" variety, or even be slightly higher in good specimens; but, in general, it is slightly lower.

2. In both varieties the actual percentage of volatile oil present is 12–16 per cent.

The "tears" themselves, however, and the tinctures prepared from them, are far more pungent in their odour than the "mass," and tinctures from it, despite this approximate equality in the percentage of oil present. It appears to us, therefore, that notwithstanding the greater proportion of oil in the mass, the composition of it might be different, and needed further investigation.

Tinctures in 70 per cent. alcohol, containing approximately the same percentage of volatile oil, were prepared, and to similar volumes of them, further diluted with twice their bulk of 90 per cent. alcohol, an equal volume of 5 per cent. silver nitrate solution was added, and they were allowed to stand in the dark for twelve hours.

Tinctures were also prepared from the drug that had been dried in the oven, and treated in the same way.

They presented the following appearance at the end of that time :—

1. Tinct. asafetida from tears in 70 per cent. alcohol, black precipitate and sides of tube covered with film of silver sulphide.

2. Tinct. asafetida from mass in 70 per cent. alcohol, black precipitate, much less than in 1, and only a thin film of silver sulphide on walls of tube.

3. Tinct. asafetida from tears (dried for 171 hours) in 70 per cent. alcohol, slight black precipitate, scarcely less dense than 2. No film on sides of tube.

4. Tinct. asafetida from mass (dried for 171 hours) in 70 per cent. alcohol, no precipitate, and no film of silver sulphide, colour practically unchanged.

Thus, a much higher proportion of sulphur is indicated in the oil of the tears than in the oil of the mass. An attempt was therefore made to determine the sulphur in the following manner :—

Of each of the tinctures containing approximately the same amount of volatile oil 10 c.c. was introduced into 100 c.c. of Erlenmeyer, and 10 c.c. of N/1 alcoholic potash and 10 c.c. of 90 per cent. alcohol added, and allowed to stand at room temperature for twenty-four hours. It was then boiled under a reflux condenser for six hours, at the end of which time the alcohol was cautiously evaporated on a water-bath, the residue dissolved in 25 c.c. of water, and oxidized by nitric acid and bromine in the ordinary way, the sulphur being estimated as sulphate.

This process gave the following figures :—

MASS

Sulphur=0·063 Gm./100 c.c. tincture.

TEARS

Sulphur—0·330 Gm./100 c.c. tincture.

or, since the tinctures were made from the drug used in experiment (1) : —

Sulphur in oil from mass= 2·06 per cent.
Sulphur in oil from tears=10·44 per cent.

It would seem that the oil from the "tears" is richer in sulphur compounds, such as $C_7H_{14}S_2$, $C_8H_{16}S_2$, $C_{10}H_{20}S_2$, and $C_{10}H_{13}S_2$, which Semmler was able to isolate from asafetida oil, while it is probable that the oil from the "mass" contains a larger proportion of the bodies not containing sulphur, that is, the two terpenes, the sesquiterpene, and the oxygenated body $(C_{10}H_{16}O)_n$, which Semmler also recognized as being present.

We conclude, then, that the oil of the tears differs materially from that of the mass. If the therapeutic action of the drug is almost entirely due to the subjective effect produced in virtue of the abominable taste and smell, as most authorities aver, we

do not agree with Dieterich that the mass is preferable to the tears for pharmaceutical purposes. If, however, its chief effect is ascribed to the stimulant action on the walls of the stomach and intestines, like other volatile oils of far less pungent nature, it is possible that the use of the mass may be as advisable as, or even better than, the use of the tears in pharmacy. We think that systematic therapeutic experiments should be conducted with the oils, or for convenience with standard tinctures prepared with 90 per cent. alcohol. We may say that we fail to see the advisability of stipulating that asafetida be tested with 90 per cent. alcohol, and then preparing the tincture with the use of 70 per cent. alcohol. Upon the results of such therapeutic experiments should be based a revised monograph for asafetida for the British Pharmacopœia. It is, of course, imperative that asafetida for strictly trade purposes must have a malodorous path of its own. In addition to this, the botanical source of the asafetida of commerce, viz., tears and mass, stands in need of further inquiry, and the question should be reinstated in the Research List.

Discussion

Mr. Naylor said he had never had the opportunity of distilling the oil from asafetida, and what he desired to know was whether the residue left after distillation had the strong smell of the drug.

Mr. Henderson also rather doubted whether oil of asafetida was a commercial article.

Mr. F. H. Alcock said that the question of the determination of volatile oil in drugs arose in his paper on turmeric, which he had that morning read. What he found with this, as also saffron and some other drugs, was that on exposing the drug to the action of the water-bath, water and volatile oil were driven off, but the water was somewhat regularly reabsorbed, and the difference represented roughly the volatile oil which agreed fairly well for some purposes with the text-book amount of this constituent. With reference to the commercial oil of asafetida, its composition is said to be of the nature of an allyl sulpho-derivative ; that being so, it could be easily got artificially, and he was not sure whether it was not quoted in the chemical price-lists. There was no doubt that many evil-smelling thio-compounds were produced and much used in the chemical laboratory, and he related how that a local D.Sc. at the Technical School endeavoured

to dispose of some which he had no further need for, by blowing it to the winds and disturbing the purity of the surrounding air for some time and some distance away from the building.

Mr. H. W. Gadd asked was there demand for asafetida at the present time? It would be interesting if experienced dispensers would tell them whether they had found any considerable demand for tincture and other preparations of asafetida.

Mr. Finnemore said that in his experience asafetida was prescribed by the London medical men. With regard to the uses of asafetida, he could endorse the remarks in the paper that it was used in hysterical cases.

Mr. R. A. Cripps also said he had found that asafetida was in demand. He was very glad that Mr. Umney had used nitrogen in place of oxygen, when there would be less fear of oxidation or interference with the volatile oil. To him the time occupied in the process was rather long. Had Mr. Umney tried mixing sand with the asafetida? Then he thought that one hour would be sufficient.

Mr. S. Taylor remarked that asafetida had been in demand in his experience, and said that it was called for under another name.

Mr. J. A. Thomas, speaking with a lengthy hospital experience, had found the drug frequently prescribed primarily to prevent hypochondriacs from returning to the hospital too frequently. It was also used as an enema with marked effect.

Mr. R. L. Whigham, speaking as a West End pharmacist, said he could testify that the drug was largely used in the West End of London.

Mr. E. S. Peck said the drug had recently been prescribed in Cambridge by local medical practitioners in the form of Pil. Galbani Co. in capsules, so that it was not the taste altogether which was wanted, but to ensure remedial effect.

Mr. Maltby Clague did not think that the drug was only prescribed simply on account of what may be called its moral effect, but as an antispasmodic. Its unpleasantness was therefore not its chief effect, or why should Pil. Galbani Co. be prescribed for its asafetida. He emphasized that one medical man insisted upon a water treatment during the process of its manufacture, which softened the mass, which was then put through muslin.

Mr. G. C. Druce stated that in India and Continental countries it was largely used, not only as a medicine, but consumed in food, and therefore could not only be of use for its nasty taste.

Mr. UMNEY, in his reply, stated that at least nineteen-twentieths of asafetida was not used in pharmacy; a large quantity of the mass went to the Continent for culinary purposes. This was due to the fact that the mass contained far less sulphur compounds than the tears.

The thanks of the Conference were passed to the authors for this contribution.

LIQUID EXTRACT OF ERGOT: NOTE ON AN IMPROVED METHOD OF PREPARATION

BY J. H. FRANKLIN

WITH RESULTS OF PHYSIOLOGICAL TESTS MADE BY

G. S. HAYNES, M.D.

The greatest interest is being taken by members of both the medical and pharmaceutical professions in the highly interesting chemical researches into the composition of ergot, and the constantly changing opinions as to the active principles isolated; but little research appears to be undertaken at the present time, having for its object the improvement of the galenical preparations on which the reputation of this important drug was mainly built up. One of the first things I noticed, and one that was constantly impressed on my mind throughout the process of making the galenical preparations of ergot, was the ease with which extraction took place when a semi-alcoholic menstruum was used in place of water, and this simplicity of extraction and other reasoning often suggested that some simple pharmaceutical research on the above lines might result in the discovery of a preparation which should prove at once more potent, and certainly far more uniform in activity than the doubtful official liquid extract of the British Pharmacopœia, and one which could be relied upon by the physician to give the physiological effects of this valuable drug. Clinical results, communicated to the writer from time to time, have confirmed the reasoning that a superior product is obtained as indicated above, viz., by the use of a percentage of alcohol in the menstruum, and have also occasionally condemned the liquid extract made exactly by the pharmacopœial method. In addition to the ease with which extraction takes place when a diluted alcoholic menstruum is employed in preparing a liquid extract, it should also be mentioned that the product is richer in colour, contains a higher percentage of total solid matter, and preserves in a

greater degree the aroma natural to the drug. When the proportion of 50 per cent. of alcohol in the menstruum is exceeded, the total solids and colouring matter begin to decrease, and, as noted later, you do not get any increase of potency in the preparations. Precipitation also occurs on diluting with water or saline solution, which is an objection.

With the advent of physiological standardization, it became possible to verify early experiences, and after numerous disappointments with the physiological assay of the B.P. liquid extract, it was decided to prepare two samples of liquid extract, one by the official process, and the other by using a semi-alcoholic menstruum; both samples being, of course, made from the same lot of Spanish ergot of rye. These samples were made in duplicate on three separate occasions, and gave the following remarkable results :—

Date.	Method.	Kind of Ergot	Blood Pressure Test.
Mar., 1909	B.P. . . .	Spanish	1 c.c. of a 1 in 3 solution causes a rise of blood pressure of 20 mm. of mercury.
Mar., 1909	Semi-alcoholic menstruum	Spanish	Ditto. Excellent quality. Rise in blood pressure 40 mm. of mercury.
May, 1909	B.P. . . .	Spanish	Practically inactive.
May, 1909	Semi-alcoholic menstruum	Spanish	A good active sample. 2 c.c. of 1 in 3 solution raises the blood pressure 54 mm. of mercury.
Dec., 1909	B.P. . . .	Spanish	Inferior. Gives hardly any response to the blood pressure test.
Dec., 1909	Semi-alcoholic menstruum	Spanish	Active, and reaches our standard. Rise in blood pressure 20 mm. of mercury.

As these results show conclusively the immense gain in potency of the preparation, judged by the blood pressure test, and this appears to be entirely due to the introduction of alcohol into the menstruum, it was desirable to ascertain what proportion of alcohol in the menstruum yielded the best results, and with this object Dr. Haynes, of the Pharmacological Laboratory, Cambridge, very kindly undertook to examine a more extended series of liquid extracts. These were made from a sound sample

of ergot of rye, which was thoroughly mixed after grinding to ensure uniformity. The physical characters and blood pressure tests were then taken, with the results recorded below:—

Date.	No.	Method.	Ergot.	Total Solids per 100 c.c.	Sp Gr	Percentage Alcohol by volume.	Blood Pressure Test.
Jan., 1910	1	B.P.	Spanish	14·62	1·027	29·7	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 22 mm. of mercury.
Jan., 1910	2	Alcohol, 20%	Spanish	18·22	1·065	15·5	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 30 mm. of mercury.
Jan., 1910	3	Alcohol, 35%	Spanish	16·3	1·036	27·6	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 32 mm. of mercury.
Jan., 1910	4	Alcohol, 50%	Spanish	15·92	1·008	42·4	No increase in potency.
Jan., 1910	5	Alcohol, 70%	Spanish	12·72	0·941	62·95	
Jan., 1910	6	Alcohol, 90%	Spanish	6·42	0·860	84·0	

Dr. Haynes reported:—"My experiments confirm your observations that an alcoholic menstruum gives a better preparation as regards the physiological activity."

At Dr. Haynes's request, two further samples of the B.P. liquid extract were made from different consignments of ergot, and a corresponding preparation of each made with a 25 per cent. alcoholic menstruum, in order to supplement and confirm previous experiments.

Dr. Haynes, in his final report, said:—"You will notice that the result of preparing an extract with a semi-alcoholic menstruum is to increase the activity, as compared with a watery extract; this result, however, I could not obtain with the samples made from Russian ergot. I am quite convinced that a more reliable and more active extract can be made from ergot by using a semi-alcoholic menstruum (e.g., 25 per cent.) than by closely following the B.P. process."

Date.	No.	Method.	Ergot	Total Solid per 100 c.c.	Sp. Gr.	Percentage Alcohol by Volume.	Blood Pressure Test.
April, 1910	7	B.P.	Spanish	15·2	1·032	31·0	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 14 mm. of mercury.
April, 1910	8	25% Alcohol	Spanish	17·4	1·060	19·9	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 28 mm. of mercury.
April, 1910	9	B.P.	Russian	14·0	1·026	31·5	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 19 mm. of mercury.
April, 1910	10	25% Alcohol	Russian	14·9	1·050	21·0	1 c.c. of a 1 in 3 solution injected. Rise in blood pressure 19 mm. of mercury.

In conclusion, it may be pointed out that, however carefully we may select our samples of ergot for the preparation of the official liquid extract, it is certain that the products will vary greatly in potency, and a considerable percentage are almost certain to be inert, whilst not a single sample prepared with a semi-alcoholic menstruum falls below the standard set by pharmacologists, and in this respect Dr. Goodall found that as high a proportion as 76 per cent. of the commercial samples of liquid extract of ergot which he examined failed to cause a satisfactory rise of blood pressure.[1] Although experiments 9 and 10 with Russian ergot do not indicate any great superiority in the alcoholic process, the evidence of eight other experiments is uniformly to the disadvantage of the cold water process, and therefore it seems safe to assume (after the numerous failures to prepare a satisfactory aqueous liquid extract of ergot) that the introduction of a semi-alcoholic menstruum of about 35 per cent. strength will give a product of much greater potency, and at the same time remove the suspicion that has undoubtedly fallen upon the official liquid extract of ergot. A suitable process would be to exhaust ergot in coarse powder with 35 per cent. alcohol, as in the formula for liquid extract of hamamelis in the British Pharmacopœia, when the product will be sufficiently

[1] Dr. Goodall, *Edinburgh Medical Journal*, July, 1909.

strong in alcohol to keep well. The British Pharmacopœia stands almost alone in the use of an aqueous solvent for extracting ergot in the preparation of the liquid extract, and in consequence of its defects already referred to, this formula is recommended as a distinct advance over the one now authoritative. The experiments necessary for this investigation were conducted in the laboratories of Messrs. J. Woolley, Sons, and Co., Limited, Manchester, to whom I am deeply indebted for permission to publish the results. My special thanks are also due to Dr. Haynes for his kindness in making the physiological examination of the numerous samples.

Discussion

The President remarked that this was a model paper in which the pharmacist and medical man had collaborated to considerable advantage.

Mr. R. A. Cripps agreed that this was a subject which he happened to have taken considerable interest in, and he had pleasure in stating that his results were similar to those of Mr. Franklin. Some years ago he made some experiments in that direction, and suggested to him the use of repercolation with a hydro-alcoholic extraction. If he did that he thought he would find it advantageous.

Mr. R. R. Bennett said he thought it was generally admitted that ergotoxine is the most important principle of ergot, and since ergotoxine, like other alkaloids, is more soluble in alcohol than in water, one might expect some such results as Mr. Franklin had indicated. It had been reported from the Wellcome research laboratory that a watery preparation of ergot retains its effect on blood pressure even after treatment which removes what little ergotoxine it originally contained. In a later paper the pressor activity of aqueous extracts of ergot was attributed to *p*-hydroxyphenylethylamine, which is said to be formed from leucine by bacterial activity. If such amines are formed by fermentation and the activity depends upon such bodies, so long must we expect variation in watery preparations of ergot.

Mr. W. A. H. Naylor pointed out that the late Dr. Squibb, of New York, thirty years ago conducted a series of investigations on ergot with the object of endeavouring to elicit the information as to whether the water or alcoholic extracton was the better, and he concluded that as the result of clinical observation the latter was more effectual.

Mr. N. H. Martin said he had the privilege of an intimate acquaintance with the late Dr. Squibb, and he had used a process based upon Dr. Squibb's recommendation, although three years ago he and Dr. Martin started the pharmacological laboratory at Newcastle, and as their preparation during thirty years had been an active one, he was not so sure of the amount of reliance to be put upon the blood pressure test.

Mr. Henderson asked whether Mr. Franklin recommended that in the next Pharmacopœia Spanish ergot should be included.

Mr. Rutherford Hill said Dr. Goodall found that many samples condemned by the physiological test acted efficiently on the uterine muscles, and that was the chief purpose for which ergot was used. In many cases still doctors refused to use fluid extract, and insisted on a fresh infusion of the drug, so that our aqueous menstruum seemed to yield an active product. He would like to ask if Dr. Haynes tried the action of any of the samples on uterine muscle.

Mr. Finnemore pointed out that ergotoxine was in danger of being displaced as a blood-pressure-raising instrument, and the pituitary gland was taking its place.

Mr. Franklin, in reply, said that he had had this paper in his mind for many years. His results were a confirmation of Squibb's method, and he laid no stress on the results obtained with Russian ergot as indicated in the paper. Replying to Mr. Hill, the reason why 35 per cent. alcohol was selected was that the finished product then contained the same percentage of alcohol as the B.P.

CHEMICAL EXAMINATION OF THE RHIZOME OF CIMICIFUGA RACEMOSA

By Horace Finnemore, B.Sc. (Lond.), F.I.C.

The dried rhizome and roots of *Cimicifuga racemosa*, Elliott, are official in the British Pharmacopœia, and in that of the United States. According to Dixon, *Manual of Pharmacology*, 1908, the drug is classed as a simple bitter, but it is sometimes administered as a remedy for rheumatic affections, neuralgia and for chorea. Many investigations of this drug have been undertaken, but the results have been somewhat contradictory. In 1871, Conard (*Amer. Journ. Pharm.*, 43, 151) announced the isolation of an ill-defined crystalline substance of a light yellow colour, but no analysis was recorded, and there is little doubt

from his description that he was dealing with an indefinite body. However, in 1884, Falck (*Amer. Journ. Pharm.*, 4, 14, 459) confirmed the isolation of a crystalline body, which was considered by him to be identical with that isolated by Conard, although he differed from the latter in believing it to be an alkaloid.

Subsequent investigations seem to have been conducted with the object of confirming these results, but several workers have recorded their inability to obtain this or any other definite body. H. Trimble, however, noted (*Amer. Journ. Pharm.*, 50, 468) the presence of some substance which gave with ferric chloride a dark green colour, similar to that produced by quercitrin, but no record has been found of the isolation of this body; indeed, it would seem from the present work that this colouration was due to the presence of a tannin.

Gallaher (*Amer. Journ. Pharm.*, 4, 17, 545) obtained crystals from the tincture, which, after washing with alcohol and boiling with hydrochloric acid, reduced Fehling's solution, and were considered to be cane sugar.

Most of the current works on pharmacognosy mention "racemosin" as the chief constituent of this drug, and, through the courtesy of the Curator, Mr. E. M. Holmes, F.L.S., a small specimen was obtained from the Museum of the Pharmaceutical Society of Great Britain. This was golden yellow, brittle, and resinous, and on examination appeared to correspond to that part of the extract of the drug which has been found to be soluble in chloroform.

The attention of the present author was called to this subject by the Research List published by the British Pharmaceutical Conference, and to the Executive Committee the author wishes to acknowledge his thanks for a grant which has covered the expense of the material. Thanks are also due to Mr. G. E. Town for ready help in the extraction of this large amount of material. The sample of drug used answered the description in the British Pharmacopœia, and was further identified as the genuine drug by Mr. E. M. Holmes.

Extraction.—Forty kilos. of the coarsely powdered drug were completely extracted with hot alcohol by continuous percolation in a large Soxhlet apparatus. The greater part of the alcohol having been removed, a portion of the resulting extract was submitted to distillation in steam, but nothing definite was removed by this treatment. The remainder of the dark brown extract was then subjected to treatment, as hereafter described,

with the following solvents: water, petroleum ether (boiling point, 40° to 60°), ether, chloroform, ethyl acetate, and alcohol.

Aqueous Solution of the Alcoholic Extract.—The thick alcoholic extract, prepared as above described, containing about 2·8 kilos. of solids, was now boiled with water to remove the remaining alcohol. This treatment also caused the precipitation of a large amount of resinous material, from which, whilst still hot, the aqueous solution was filtered. The resinous material was then washed with three successive quantities of boiling water, and the washings evaporated to a convenient bulk and mixed with the aqueous solution.

Isolation of Isoferulic Acid.—The aqueous solution thus obtained was thoroughly extracted with successive small quantities of ether, the amber-coloured ether solution concentrated somewhat and shaken with small quantities of a 5 per cent. solution of sodium carbonate. The first alkaline solution obtained yielded on acidification a small amount of resinous precipitate which slowly crystallized, the succeeding ones when acidified gave at once a crystalline precipitate which was purified by recrystallization from ethyl acetate containing a small quantity of dilute alcohol, using animal charcoal to remove adhering colouring matter. The substance was finally recrystallized from hot water, from which it separated in long needles, melting at 228°. About 3 Gm. of this body were obtained.

0·1264 gave 0·2857 CO_2 and 0·0606 H_2O. C = 61·6, H = 5·3.
0·1268 gave 0·2868 CO_2 and 0·0615 H_2O. C = 61·7, H = 5·4.
$C_{10}H_{10}O_4$ requires C = 61·8 and H = 5·1 per cent.

This substance liberates carbon dioxide from a carbonate, and immediately reduces an alkaline solution of potassium permanganate. With ferric chloride no colour is produced. When boiled with slightly diluted sulphuric acid the solution first exhibits a distinct fluorescence, then gradually becomes reddish-purple, and develops an odour resembling guaiacol; the fluorescence is destroyed by alkalies. 0·2189 neutralized 0·0655 KOH; neutralization value 187. $C_9H_9O_2COOH$ requires neutralization value 194.

When boiled with hydriodic acid containing a little acetic anhydride, as in Hewitt's modified Zeisel-Perkin process:

0·2705 gave 0·3202 AgI. MeO=15·6. $C_8H_6O(COOH)(OCH_3)$ requires MeO 15·9 per cent.

After this determination the residue in the distillation flask was mixed with a solution of sodium sulphite and extracted with

ether, the ether solution washed, dried, and evaporated. A yellow syrup was obtained, which could not be crystallized. This gave in alcoholic solution with ferric chloride, a green colouration, changing to reddish-purple on the addition of sodium carbonate —the characteristic reaction of catechol derivatives. From this it was apparent that the original substance contained either two methoxyl groups or one methoxyl and one hydroxyl attached to a benzene nucleus in the ortho-position, since both such bodies would give a catechol with hydriodic acid. The substance under consideration obviously contained a hydroxyl group, as it readily gave an acetyl derivative.

Acetyl Derivative.—A quantity was boiled for two hours with excess of acetic anhydride and fused sodium acetate. After removing the excess of acetic anhydride the product was mixed with water and extracted with ether, the ether solution dried, evaporated, and the syrup crystallized from ethyl acetate. Melting point 199°.

0·0865 gave 0·1932 CO_2 and 0·0407 H_2O. $C = 60·9$; $H = 5·2$.

$C_8H_5(OAc)(COOH)(OCH_3)$ requires $C = 61·0$; $H = 5·1$ per cent.

This acid would thus appear to be identical with isoferulic (hesperetic) acid, 4-methoxy-3-hydroxycinnamic acid ($C_6H_3OCH_3OHCH : CHCOOH$), which was obtained by Tiemann and Nagai (*Ber.*, 11, 654), by methylating caffeic acid, and subsequently by Tiemann and Will, by the hydrolysis of hesperetin. (*Ber.*, 14, 955). As far as is known to the present author, this is the first recorded instance of its occurrence in nature. Further evidence of its identity was obtained by reduction with sodium amalgam, and the product crystallized from hot water. Its melting-point (146°) and other properties agree with those of hydroisoferulic acid ($C_6H_3OH·OCH_3·CH_2CH_2COOH$).

The ether solution from which the isoferulic acid had been extracted was now shaken with a solution of potassium hydroxide, but nothing definite was removed. It was then washed with water, dried, and the solvent recovered, when 15 Gm. of a semi-stolid sticky residue were left. This gave in dilute solution a green colour with ferric chloride. Attempts to obtain crystalline products from it were not successful.

After the original aqueous solution of the extract had been shaken with ether as above described, it was then thoroughly shaken with ethyl acetate. This caused the gradual separation

of about 0·1 Gm. of crystalline substance. This body is soluble in water, but sparingly so in organic solvents. It was recrystallized from ethyl acetate containing dilute alcohol. Meltings point, 152°. Nothing definite could be obtained from thi-ethyl acetate solution; it contained 21 Gm. of syrupy material, which gave with ferric chloride a green colour.

Subsequent shaking of the aqueous solution of the extract with other solvents yielded nothing definite.

Treatment with Lead Subacetate.—After shaking with immiscible solvents as just described, the original aqueous solution was now mixed with two successive portions of lead subacetate solution, and the two fractions of insoluble lead salts separately examined. These were decomposed with sulphuretted hydrogen, filtered from the lead sulphide, and the filtrates evaporated at a gentle heat to a suitable bulk, and then mixed with a small quantity of the previously extracted drug and the whole dried. The product from the first precipitate was extracted with various solvents. Ethyl acetate dissolved about 2 Gm. of material which gave with ferric chloride a green colour. The second fraction of lead salts gave by similar treatment to ethyl acetate a syrupy residue, which gave with ferric chloride a fine purple red colour. On drying this residue, crystals slowly sublimed; these were collected and were crystallized from boiling water. When pure they melted at 156°, and the melting-point was not affected by mixing with a small quantity of salicylic acid. In view of the use of this drug, the presence of this acid, although in minute quantity, is very significant.

The filtrate from the insoluble lead salts reduced an alkaline copper solution, and readily gave D-phenylglucosazone which, when crystallized from pyridine containing dilute alcohol, and finally from aqueous pyridine, melted when rapidly heated at 209°.

Petroleum Ether Solution of the Extract.—After the original alcoholic extract had been treated with water as above described, the residue insoluble in that liquid was dried, and was then obtained in the form of a light-brown, soft, brittle resin. A quantity of 1·5 kilos. was mixed with a suitable amount of the powdered drug, which had been previously exhausted with alcohol and subsequently dried. The whole was now extracted in a Soxhlet with petroleum ether, and the resulting solution concentrated. It was then greenish-yellow in colour; on standing, an amorphous precipitate weighing 16 Gm. separated. This was filtered off at the pump and distilled under diminished

pressure, and was then found to be identical with the palmitic acid subsequently obtained.

Free Fatty Acids.—The solution from which this body had separated was now evaporated, when an oil was obtained weighing 103 Gm. This was dissolved in ether, and the solution shaken with 10 per cent. aqueous sodium carbonate to remove free acids. The resulting alkaline solution was separated, washed with ether, acidified and extracted with ether, the ether solution washed, dried, and the solvent recovered. The acid so obtained weighed 20 Gm. On standing, a small amount of solid was deposited, which was removed, drained on porous porcelain, and examined with the solid acids. The filtrate from this was then distilled under diminished pressure, the first fraction at 230°–236°/12 mm. weighed 7·5 Gm. and quickly became solid; as it distilled about the same temperature as the solid acids obtained later by hydrolysis, the two were mixed and examined together. The second fraction distilled between 270° and 280°/20 mm., and consisted of a dark yellow oil which deposited a small amount of crystalline matter, which was filtered off and mixed with the previous fraction. 0·3245 absorbed 0·3988 of iodine. Iodine value, 123. Iodine value of oleic acid = 90. This fraction apparently contained oleic and other more unsaturated acids.

Isolation of a Phytosterol.—After the removal of the free fatty acids as above described, the ether solution was shaken with potassium hydroxide solution, but on acidification of this liquid nothing was precipitated. The ether solution was then evaporated, and the residue, weighing 35 Gm., dissolved in alcohol, excess of caustic potash added, and the whole boiled until saponification was completed. The alcohol was then recovered, and the resulting soap dissolved in water, and the solution extracted with ether. The ether solution was dried and the solvent removed, whereupon the syrupy extract solidified on cooling. This was purified by crystallization from ethyl acetate and 0·5 Gm. of flat needles obtained, melting at 138°.

0 0882 gave 0·2653 CO_2 and 0·0906 H_2C; C=82·0. H=11·4.

$C_{20}H_{34}O$ requires C = 82·8; H = 11·7 per cent.

When this substance was boiled with a little acetic anhydride, chloroform and a drop of sulphuric acid added, a magnificent magenta colour was produced, which rapidly changed to green. This substance was therefore a member of the phytosterol group of bodies. The mother liquid from which the phytosterol had crystallized was acetylated, and a solid obtained, which, after

crystallization from acetone, melted at about 114°, and appeared to be the acetate of the phytosterol.

Volatile Fatty Acids.—After the removal of the phytosterol from the soap solution this was then acidified and steam distilled until the distillate was no longer acid. About 2 litres of distillate were obtained, which was neutralized with barium carbonate, evaporated to a convenient bulk, and the regenerated acids converted into their silver salts by boiling with silver oxide. On cooling the solution of the silver salts the white deposit first formed was separated and dried. The filtrate from this gave on further cooling a second crystalline deposit, which was separated; finally a third fraction was obtained by evaporating the filtrate from the second to dryness.

(1) 0·2807 gave 0·1797 Ag. Ag = 64·0.
(2) 0·2383 gave 0·1522 Ag. Ag = 63·9.
(3) 0·6815 gave 0·4380 Ag. Ag = 64·3.

Silver acetate and silver propionate contain respectively 64·6 and 59·6 per cent. Ag.

Solid Fatty Acids.—After the removal of the volatile acids, the contents of the flask were allowed to cool, when a solid cake of fatty acids separated. As all attempts to obtain a pure product by crystallization were unsuccessful, the whole was then distilled under diminished pressure. The distillate was a yellow oil, which quickly solidified to a crystalline mass. It was mixed with the solid acids previously mentioned, and re-crystallized from methyl alcohol; the melting-point became constant at 59–60°.

0·1103 gave 0·3026 CO_2 and 0·1247 H_2O. C=74·8; H=12·5.
$C_{16}H_{32}O_2$ requires C = 75·0; H = 12·5 per cent.

This acid was thus seen to be practically pure palmitic acid.

Ether Solution of the Extract.—After treatment of the original extract with petroleum ether it was then extracted with dry ether. The ether solution was concentrated and allowed to stand all night, when a brownish-white solid had separated. This was filtered off and washed with cold ether, and purified by crystallization from benzene containing dilute alcohol, and finally from aqueous pyridine, from which it separated in colourless needles, melting point 202°, about 0·2 Gm. of this substance was obtained.

0·0838 gave when dried at 120°, 0·0059 H_2O. H_2O = 7·0; $C_{16}H_{22}O_4 \cdot H_2O$ requires H_2O = 6·7 per cent.

0·0621 gave 0·1495 CO_2 and 0·0503 H_2O. C = 65·6; H = 9·0. $C_{14}H_{22}O_4$ requires C = 66·0; H = 8·6 per cent.

This substance was not affected by boiling with strong potash solution, nor had it any action on alkaline solution of potassium permanganate. It is sparingly soluble in most of the usual organic solvents, but dissolves in strong sulphuric acid, forming a yellow solution with a bronze-green fluorescence. When boiled with hydriodic acid, methyl iodide was obtained.

After the deposition of the above substance, the solvent was now removed from the ether solution, and a golden-yellow coloured resin, weighing 280 Gm., was obtained. On attempting to dissolve it again in the same solvent, it was found that only about 60 per cent. was soluble. This solution was shaken with aqueous sodium carbonate, and a further small amount of isoferulic acid obtained. Attempts to obtain definite substances from this extract were not successful, with the exception that when saponified a small quantity of ammonia was evolved, and the phytosterol previously isolated from the petroleum ether extract was obtained, together with small amounts of formic and butyric acids.

Chloroform Solution of the Extract.—After the above treatment the extract was now treated with chloroform, and the solution allowed to stand all night, when it was found to have deposited a white solid, which was separated at the pump and washed with a little cold chloroform. It was then in the form of a soft, nearly white powder, which readily crystallized from a mixture of alcohol and water in the form of well-defined flat plates. It can also be easily crystallized from dilute pyridine, but it is sparingly soluble in most of the usual organic solvents. About 50 Gm. were obtained, which was at first suspected to be a mixture, but no separation was effected by fractional crystallization, and in view of the absence of crystalline derivatives, no evidence could be obtained of its constitution.

0·1433 of anhydrous substance gave 0·3490 CO_2 and 0·1130 H_2O. $C = 66{\cdot}4$; $H = 8{\cdot}8$.

$C_{15}H_{24}O_4$ requires $C = 67{\cdot}1$; $H = 8{\cdot}9$ per cent.

The substance containing water of crystallization softens at 236°, and melts about 244°, and the anhydrous substance melts at 217°–222°. It appears to be an alcohol, as on attempting to acetylate it there was obtained a syrupy body, which could not be crystallized, and a similar syrup was obtained when attempting to benzoylate it by the usual method or by Deninger's method.

The absence of methoxyl groups was proved by boiling with

hydriodic acid. This substance dissolves in sulphuric acid, forming a solution with a bronze-green fluorescence similar to that produced by the above-described body, and by the substance to be described later. It is insoluble in potash solution. There is a great similarity in the general properties of these three bodies.

After the substance described above had been filtered off, the chloroform solution was concentrated and allowed to stand for a few days, when a brownish granular deposit separated. This was dissolved in alcohol and boiled with animal charcoal for some hours. The alcoholic solution gradually deposited a small quantity of a colourless crystalline body, which was purified by recrystallization from ethyl acetate containing a little dilute alcohol. It separated from this solution in flat plates, melting point 218°–220°. About 5 Gm. of this substance were obtained. With sulphuric acid this yields a yellow solution with a bronze-green fluorescence, and on dilution the solution became purplish-red.

The absence of methoxyl groups was proved by heating with hydriodic acid.

0·1170 of anhydrous substance gave 0·2850 CO_2 and 0·0990 H_2O. C = 66·4, H = 9·4.

$C_{15}H_{24}O_4$ requires C = 67·1 ; H 8·9 = per cent.

An acetyl derivative was obtained as a soft resin, but all attempts to obtain it crystalline were unsuccessful.

Ethyl Acetate and Alcoholic Solution of the Extract.—These were dark-brown extracts, amounting to 130 Gm. and 162 Gm. respectively. Although they were subjected to a lengthy examination nothing definite was obtained from either of them,

Test for Alkaloids.—The original drug was allowed to stand in contact with ammonia and ether for a short time, the ether removed and the residue from this re-dissolved in dilute acid. This solution gave evidence of alkaloids with the usual reagents, but in very small amount. In another experiment the alcoholic extract was macerated with dilute hydrochloric for a week; although the solution gave a greater indication of the presence of alkaloids the quantity of these was much too small to justify a further search.

SUMMARY

The following products have been isolated from *Cimicifuga racemosa* :—isoferulic acid ; a small quantity of salicylic acid,

a trace of substance, melting point, 152° ; palmitic acid ; a phytosterol ; three crystalline bodies, apparently alcohols, one of which has the empirical formula $C_{14}H_{22}O_4$, the other two being represented by the formula $C_{15}H_{24}O_4$.

Pharmaceutical Department, Guy's Hospital, S.E.

A NOTE ON THE FLOWERS OF BASSIA LATIFOLIA

By Reginald R. Bennett, B.Sc., A.I.C., Ph.C., and J. D. E. Anklesaria, Ph.C.

Bassia latifolia, Roxburgh (N.O. Sapotaceæ), is a large tree indigenous to the Central Provinces of India. In the vernacular it is known as the mowra tree, and is valued principally for its flowers, which are used as an article of food and also for the manufacture of spirit. During February and March the trees shed their leaves, and in March and April cream-coloured flowers, which cluster in dense fascicles near the ends of the branches, appear. As soon as the flowers begin to fade the fleshy corollas fall to the ground, principally during the night time, when the temperature is relatively low, and the undergrowth having been previously cleared away, the fallen corollas are swept up in the early morning and are dried in the sun. Large quantities of a potable spirit are distilled from mowra flowers in many parts of India, but the spirit is highly flavoured with volatile oil from the flowers, and this renders it unfit for pharmaceutical purposes. A method for preparing alcohol free from smell from mowra flowers has been patented, but a heavy duty was imposed by the Indian Government, and the manufacture was eventually stopped (Sir George Watt's *Dictionary of the Economic Products of India*, vol. i., p. 413).

In 1886, A. H. Church (*Nature*, vol. xxxiii., pp. 343, 344) found the flowers of *Bassia latifolia* to contain 3·2 per cent. of cane sugar, and 52 6 per cent. of invert sugar, but the percentage of sugar appears to vary considerably, the flowers grown in the hilly districts of India containing more than the flowers grown at lower levels. The following figures were obtained when working with a good commercial sample of the flowers recently submitted for examination. From 500 Gm. of the air-dried material, exhausted by repeated boiling with alcohol, 390 Gm. of a very thick, dark brown, uncrystallizable syrup was obtained. By steam distilling the syrup, a slightly opalescent distillate with a very thin film of oil floating on the surface was obtained, and on shaking this distillate with ether and evaporating the solvent,

a small quantity of a yellowish oil, possessing the characteristic odour of the native mowra spirit, was procured. A portion of the residue in the distillation flask, treated with phenyl-hydrazine and acetic acid, produced an osazone with a melting point of 208° C. Another portion of the residue was digested with milk of lime, the filtrate evaporated, and the precipitate which formed, washed, diffused in water, and decomposed by carbon dioxide. After filtering off the calcium carbonate, the filtrate was treated with basic lead acetate, the excess of lead precipitated, and the solution filtered through animal charcoal; on evaporating the filtrate and adding alcohol, crystals of cane sugar were obtained. A quantitative determination of the sugar was made volumetrically by titration with Fehling's solution. Ten Gm. of the material was exhausted with boiling alcohol, and after evaporation of the alcohol sufficient water was added to the residue to measure 500 c.c. A portion of this solution on titration with Fehling's solution gave a reading equivalent to 49·8 per cent. of invert sugar. A further portion, heated with hydrochloric acid to invert the sucrose, after neutralization gave with Fehling's solution an increased reading equivalent to 13·4 per cent. of cane sugar. The total amount of sugar present thus amounted to over 63 per cent. of the weight of the air-dried flowers.

The average amount of water in the material was 18 per cent. The ash amounted to 2·6 per cent., but this consisted, to a large extent, of sand, minute particles of which were found adhering closely to the corollas. Proteins amounted to only 0·7 per cent. An aqueous infusion of the flower fermented with yeast yielded on distillation a spirit possessing a strong odour, from which it could not be separated by repeated fractionation, but a perfectly pure spirit was prepared by digesting the strong distillate with solid potash and re-distilling—a method which was possibly the basis of the patented process to which reference has been made.

There was no discussion on the paper, and a vote of thanks was accorded to the authors.

EXTEMPORANEOUS PREPARATION OF CHLOROFORM OF BELLADONNA

By Ernest Quant, F.C.S.

At a meeting of this Conference in Manchester three years ago, a valuable paper was communicated by R. Wright on the

preparation and determination of chloroform of belladonna. The process referred to is the adopted formula of the B.P. Codex, and produces a therapeutic agent which doubtless is excellent; but to a practising pharmacist the method does not altogether commend itself. On the one hand it is not calculated to produce a preparation of definite alkaloidal strength, and on the other the working process is extravagant in time and material; employing as it does a mixture of absolute alcohol and chloroform. Percolation with this menstruum until a 1 in 1 product is obtained necessitates a considerable volume of alcohol and chloroform being left in the marc, and this, even if recovered by distillation, is of doubtful value, for besides being a mixture of these two solvents in uncertain proportions, it will probably contain variable traces of ammonia.

In the discussion following the reading of the paper to which I have alluded, I inquired whether the liquid extract of belladonna could not be employed for making the chloroform of belladonna. An answer in the negative was given; but I did not feel altogether convinced, and recently I undertook some experiments to finally settle my own mind. It is obvious that the difficulty in the way of directly employing the liquid extract of the Pharmacopœia is the presence of water, therefore the first point to deal with was a means of eliminating the water; the addition of an exsiccated salt suggested itself, and therefore I put together a mixture of liquid extract of belladonna, chloroform and dried sulphate of soda; a clear and almost colourless solution resulted; but I felt some misgivings as to whether the alkaloids had gone with the water and colouring matter, and I considered it advisable to preclude any loss of alkaloid by the cautious addition of an alkali. Ammonia was first tried, which in turn gave place to calcined magnesia, as I wished to avoid the introduction of water and alcohol as was necessary when using solution of ammonia or ammoniated alcohol; while, moreover, calcined magnesia possesses some dehydrating properties. Ultimately my formula became—

Liquid Extract of Belladonna	1 fl. ounce.
Heavy Calcined Magnesia	4 grains.
Dried Sulphate of Soda	4 drachms.
Chloroform, sufficient to produce	2 fl. ounces.

Into a dry bottle place the liquid extract with 1½ fl. ounces of chloroform and the magnesia; shake; then add 3 drachms of the dried sulphate of soda, agitate frequently during ten minutes;

filter; to the filtrate add 1 drachm of dried sulphate of soda; agitate as before and filter; add sufficient chloroform to produce 2 fl. ounces.

In practice it will be found that 1 fl. ounce of liquid extract and 1½ fl. ounces of chloroform will produce approximately 1¾ fl. ounces; it will also be found that a brighter preparation is yielded by adding the exsiccated salt in two portions.

Alkaloidal Determination.—This was performed according to the B.P. without difficulty or any modification excepting that, as I already had the alkaloids in chloroform, I commenced by taking 10 c.c. and adding 50 c.c. of water directly to it. The amount of alkaloids obtained was 0·34 Gm. in 100 c.c. It therefore appears evident that the process, apart from possessing extreme simplicity which enables it to be extemporaneously performed at the dispensing counter, permits the use of the standardized liquid extract required for all official preparations of belladonna root.

Discussion

Mr. R. A. Cripps complimented Mr. Quant on this valuable paper, which he thought was of just the character required at meetings of the Conference. If they had more papers of this class he thought that more practising pharmacists would attend. The method described commended itself for its great rapidity and simplicity. It was of the greatest advantage to have a standardized liquid extract from which all other preparations of a drug could be made, and this paper was a step in the right direction.

A vote of thanks was passed to Mr. Quant, and the President, endorsing the remarks, said this was a practical and useful paper.

NOTE ON THE FILLING OF HYPODERMIC AMPOULES

By Thos. Stephenson, Ph.C., F.R.S.E., F.C.S.

The preparation of a satisfactory hypodermic injection has always been a problem to physician and pharmacist alike. In these days when the fear of microbic contamination has attained the dignity almost of a cult, the old rough-and-ready method of simply making and filtering a solution cannot be tolerated. Hypodermic tablets meet the difficulty only in regard to measure-

ment of doses and rapidity of preparation, but the danger of contamination is in no way lessened by their use. Absolute sterility and permanence, combined with accurate dosage, is a necessity, and these conditions are fulfilled in perfection by the hypodermic ampoule. This is a sealed glass capsule, containing a measured dose of hypodermic solution, thoroughly sterile; the capsule is of a suitable shape to allow of its being carried about in the pocket-case and to admit of the contents being abstracted with a minimum of trouble to the operator and of risk of contamination to the solution.

The very mention of the word "ampoule" to the average dispensing pharmacist conjures up visions of elaborate and costly apparatus. Yet their preparation is simplicity itself. With no more unusual apparatus than an ordinary hypodermic syringe, any number of ampoules from one to fifty can be filled in as many minutes. To show how this may be done to prescription at the dispensing counter is the object of this short note.

Empty ampoules may be had from the glass dealers at a moderate cost, those of 1 c.c. capacity being listed at about 1*s.* per 100. They are supplied in white or amber glass, sealed. They should be of alkali-free glass; solutions of certain substances, such as arsacetin, are decomposed very readily when sterilized in glass containing alkali. The freedom of the glass from alkali may be readily ascertained by filling an ampoule with solution of phenolphthalein and boiling for half-an-hour. Ampoules are of various shapes, the most popular being the tube with sealed ends, and the bottle shape. The former of these can easily be made by any pharmacist in an emergency from thin glass tubing. The latter is not so easily made extempore, and had better be bought. Of the two shapes, the "tube" shape may be described as the more convenient for the pharmacist, while the latter, or "bottle" shape, presents decided advantages to the user, inasmuch as the contents are more easily and more completely abstracted with the syringe. Those of the "tube" shape are also liable to breakage through rolling off the table; the "bottle" shape is free from this objection.

The Preparation of the Solution.—This operation is most important, and necessitates great care in order to obtain absolute sterility. All utensils should be carefully sterilized, and the menstruum (distilled water, normal saline solution, etc.) boiled for some time and allowed to cool. Pegulier recommends the

sterilization of oil, when this is employed, by shaking with 90 per cent. alcohol during four or five days, decanting, and sterilizing at 125°C. In the preparation of dental local anæsthetics the addition of a small quantity of antiseptic is, as a rule, not objected to, and this simplifies matters greatly. But in the preparation of ordinary hypodermic solutions to prescription this addition is usually not expected, and every possible precaution must be taken to render the solution aseptic. In every case the solution must be filtered perfectly clear. The dispensing rule adopted in making suppositories, of using the quantities for seven when six are ordered, is a useful one to adopt in the case of ampoules; about one-sixth more solution than is actually required should be prepared, for reasons to be shown presently.

Filling the Ampoules.—In preparing ampoules to prescription—and that is all that is aimed at in this note—an ordinary hypodermic syringe is all that is necessary. The syringe should first be sterilized in the usual way. Then an ampoule is taken and the pointed end removed, as near the point as possible, by snipping sharply with scissors (holding the point downwards), or by scratching with a file and breaking off. The necessary quantity of solution, plus one or two minims to allow for loss in removal, is then drawn into the syringe, the needle inserted at the open end of the ampoule, and pushed well down to prevent the liquid collecting in the neck, and the solution injected into the bulb. A little extra solution is always desirable for the reason stated; indeed, there is no objection to a *slight* excess over the required dose, as the physician will withdraw the required quantity into a measured syringe—a much easier matter when there is a slight excess of solution. An ordinary pessary mould forms a useful stand for the ampoules during the process of filling, when these are of the tubular shape. The ampoule has now to be sealed. This is done by holding for a moment or two in a bunsen flame. If held too long in the flame the liquid is liable to become volatilized, with the result that a bubble is blown in the end, which will not be air-tight. With a little care, however, the sealing can be effected rapidly and securely.

When the ampoules contain a solution that is not injured by heat, they should be finally sterilized after sealing. This is accomplished by placing in a beaker of water and heating this in a pan of boiling water for an hour. Should a higher temperature than that of boiling water be required suitable means can easily be adopted. The water in the beaker should be coloured with

aniline blue; should any ampoule be imperfectly sealed the blue colour will then penetrate into the interior and colour the solution. For this reason, and to allow for accidental breakage during the final sterilization, it is well to prepare a few ampoules more than are actually required.

It will readily be seen that an ampoule should never be filled more than two-thirds full, in order to allow some elasticity for the contents during sterilization. In a short note like this it is impossible to describe the variations of the process necessary for different substances, but these will readily suggest themselves to the pharmacist. The entire process is simplicity itself, and only requires to be known more widely in order to furnish pharmacists, especially those who are in touch with the medical profession, with a simple, scientific, and profitable addition to their dispensing practice.

Discussion

Mr. E. S. Peck remarked that the filling of ampoules had been going on in Cambridge for several years, so that the local pharmacists had experience in them. He had found that the cheaper variety of ampoules was unsatisfactory. To ensure satisfaction he had paid 27*s*. or 30*s*. per 1,000; the cheaper kind of ampoules came to grief in the final sterilization, or when the physician attempted to break the point. The physician preferred the exact dose in each ampoule, and a 10 c.c. serum syringe was more expeditious. He would like to ask Mr. Stephenson to what temperature can adrenine be heated without decomposition.

Mr. Quant said he had found it necessary in ordering ampoules to state whether ampoules or serum flasks were required. There was a difference which was not generally recognized. Personally he had discarded the hypodermic springe for filling ampoules. He preferred to draw out a glass tube and use a teat.

Mr. Bennett said that there was another method which he had in another place described, and which on the score of simplicity was most certainly the best. He agreed that the use of a hypodermic needle was likely to give trouble, and hence he also had discarded it.

Mr. Stephenson, in reply to Mr. Peck, said that as to the cheaper ampoules, he had not found any difficulty, and they were free from alkali; they resisted the sterilizing process well, and only about 1 in 12 or 1 in 24 came to grief. He preferred

the syringe rather than Mr. Bennett's method, because his method gave a nearer approach to the quantity required. He always thought serum flasks had a larger capacity than ampoules.

SAMUEL CORBYN'S CATALOGUE OF CAMBRIDGE PLANTS

G. CLARIDGE DRUCE, M.A., F.L.S.

A Catalogue of Plants, First those which Growe Wild with us about Cambridge, except those Mentioned in Text.—20 May, 1657.

[SAMUEL CORBYN OF WORCESTERSHIRE, A MEMBER OF TRINITY COLLEGE, CAMBRIDGE.]

Sambucus aquatica, G. 1424=*Viburnum Opulus*, L.

Ribesium sylvestre, neither in Gerard nor Parkinson, found in Kent and Bedfordshire=*Ribes rubrum*, L. [recorded by Turner in the *Herbal* of 1568].

Bifolium=*Listera ovata*, Br.

Nummularia minor flo. purpurascente, G. 630=*Anagallis tenella*, Murray.

Polygala fl. caeruleo and purpureo, G. 563=*Polygala vulgaris*, L. agg.

Valeriana sylvestris maior et minor, G. 1075=*Valeriana sambucifolia*, Mikan., et *V. officinalis*, L.

Viburnum, G. 1490=*Viburnum Lantana*, L.

Anemone nemorum alba, G. 383=*Anemone nemorosa*, L.

Anagallis lutea nemorum, G. 618=*Lysimachia nemorum*, L.

Veratrum nigrum ; Helleborastrum, P. [G.] 976=*Helleborus viridis*, L.

Lysimachia lutea minor, G. 474=probably *Lysimachia vulgaris*, L.

Ranunculus flammeus major, G. 961=*Ranunculus Lingua*, L.

Brassica marina monospermos. I. Anglia, G. 315, found at Hyde in Kent=*Crambe maritima*, L.

Circaea Lutetiana=*Circaea lutetiana*, L.

Linum Catharticum, G. 550 [559]=*Linum catharticum*, L.

Linum sylvestre caeruleum. I. angustifolium caerules flore majore, Park, 1335=*L. perenne*, L.

Serratula, G. 713=*Serratula tinctoria*, L.

Cotyledon palustris, Park, 1214=*Hydrocotyle vulgaris*, L.

Lamium luteum, P. 606=*Lamium Galeobdolon*, Crantz.

Lathyrus major latifolia, G. 1229=*Lathyrus sylvestris*, L.

Orchis Serapias bifol. sive trifolia minor, P. 1350=*Habenaria bifolia*, Br.

Coronopus Ruellii, G. 427=*Coronopus procumbens*, Gil.

Caucalis minor flore rubente, Park. 921, G. 1022=*Caucalis arvensis*, Huds.

Conyza maior, Baccharis monspeliensium, G. 792=*Inula squarrosa*, Beruh.

Trachelium minus, G. 449=*Campanula glomerata*, L.

Eruca aquatica, G. 248=*Radicula sylvestris*, Druce.

Raphanus aquaticus, Park, 1226 [1228]=*Radicula amphibia*, Druce.

Pinguicula. I. Sanicula Eboracensis, G. 788=*Pinguicula vulgaris*, L.

Gramen tomentosum, G. 29=*Eriophorum polystachion*, L.

Solanum lethale=*Atropa Belladonna*, L.

Helianthemum i. Chamaecistus Anglica, G. 1281=*Helianthemum Chamaecistus*, Mill.

Serpillum hirsutum, G. 671=*Thymus Serpyllum*, L., agg. var. *hirsutum*.

Euonymus Theophrasti, G. 1468=*Euonymus europaeus*, L.

Mollugo montana, G. 1127=*Galium hercynicum*, Weig.

Ros solis folio oblongo, G. 1556=probably *Drosera longifolia*, L.

Anthyllis Leguminosa, G. 1240=*Anthyllis Vulneraria*, L.

Prunella flore albo=*Prunella vulgaris*, L., var. *alba* or possibly the recently recorded *P. laciniata*.

Myrtus Brabantica, G. 1414=*Myrica Gale*, L.

Millefolium aquaticum flo. luteo galericulato, Park. 1258=*Utricularia vulgaris*, L.

Nepeta maior i. Cattaria maior, G. 782 [683]=*Nepeta Cataria*, L.

Gnaphalium montanum album Lobelii, G. 640, a false figure both in Gerard and Parkinson=*Antennaria dioica*, Gaertn.

Equisetum foem. cauda equina, G. 1114, P. 1200=*Hippuris vulgaris*, L.

Anchusa degener facie Malii solis, P. 432= ?

Scordium=*Teucrium Scordium*, L.

Calamintha montana minor, P. 37, probably *Satureia Nepeta* Scheele.

Lysimachia spicata *caerulea* purpurea, G. 476=*Lythrum Salicaria*, L. forma.

Argemone capitulo oblongo and torulo, G. 373=*Papaver hybridum*, L., and *P. Argemone*, L.

Geranium moschatum inodorum, G. 645 [445]=*Erodium cicutarium*, L. Her.

Reseda Plinii, G. 277=*Reseda lutea*, L.

Cirsium Anglicum, G. 1183=*Cirsium britannicum*, Scop.

Fraxinus Bubula, G. 1473=*Pyrus Aucuparia*, Ehrh.

Melampyrum Cristatum, wild in our woods. It is not described in Gerard or Parkinson or Joan Bauhinum=*Melampyrum cristatum*, L.

Jacobaea angustifolia Pannonica ō laciniata, P. 668 sed videtur falso describi. Bauhino in Pinace, p. 131, Jacobaea angustifolia lanuginosa ō laciniata montana=*Senecio paludosus*, L., now extinct, but the records for this and preceding species are the earliest known.

Anagallis aquatica rotundifolia, G. 620=*Samolus Valerandi*, L.

Galega i. Ruta capraria=*Galega officinalis*, L.

Aria Theophrasti foliis obtusis Bauhinim Pinace pag. 452, found in Sandwich in Kent, not spoken of by Gerard or Parkinson= *Pyrus Aria*, Ehrh. [recorded by Lobel in the *Adversaria* of 1570].

Salix rosea was found in Kent in the same parish of Sandwich =*Salix* var.

In the foregoing list "G." refers to the second edition of Gerard's *Herbal*, 1633, "P." to Parkinson's *Theatrum* of 1640.

It is very remarkable that Ray in none of his works appears to have referred to Corbyn's list or labours.

The list precedes by three years Ray's first work, his *Catalogue of Cambridge Plants*, published in 1660.

GENERAL BUSINESS

Presentation of Books

The President, on behalf of the Conference, presented to the Cambridge Pharmaceutical Association books from the Bell and Hills Fund. The list of books was as follows:—Remington's *Pharmacy*, White and Humphrey's *Pharmacopedia*, Blythe's *Foods*, Strasburger's *Botany*, *Homœopathic Pharmacopœia*, *United States Dispensatory*, Greenish's *Materia Medica*, Dixon's *Pharmacology*, Glyn-Jones, *Poisons and Pharmacy Law*.

Mr. E. H. Church received the books on behalf of the

Association, and said how grateful the Association was to the Conference for their handsome books. They would be of great value to them, and would form the nucleus of a local pharmaceutical library.

Presentations to Mr. and Mrs. Edmund White

The President, after a delightful speech, handed to Mr. White a handsome silver rose-bowl and vases and a ring to Mrs. White as a mark of the members' appreciation of Mr. White's services as Joint Honorary General Secretary, a post which he resigned last year. Mr. Ransom alluded to Mr. White's excellent work as Secretary in connexion with the *Year-Book*. He described Mrs. White as a model Secretary's wife.

Mr. White, who was received with rounds of applause, on rising to receive the gifts, with great feeling expressed the thanks of his wife and himself for the remarkably kind things which had been said. He could see that it was not for himself, but for his wife, that the recognition was made.

Mrs. White, in a charming and graceful speech, expressed her gratitude to the Conference and said she had always received much kindness from the members, and thought that it was very good of them to give her this additional and lasting evidence of their kindness and goodwill.

Next Year's Meeting Place

Mr. T. A. White, President of the Portsmouth Local Pharmaceutical Association, gave a very hearty invitation to the Conference to visit Portsmouth next year.

Mr. Bell supported this, and said the outlying districts would also like to join in this invitation.

Mr. Barlow also supported the invitation.

Mr. J. C. Umney proposed that the invitation be accepted, and this was seconded by Mr. W. F. Hay, and agreed to amidst general applause.

Change in Constitution

Mr. J. C. Umney proposed an alteration in the constitution of the Conference—namely, that Article 1, Object 4, should

read after the word "established," "for the advancement of the science and practice of pharmacy."

Mr. TOCHER seconded, and pointed out the effect of the motion.

Mr. EDMUND JONES heartily agreed with what was proposed, and suggested which part of the Federation's work could be done by the Conference and which by the Pharmaceutical Society.

Mr. WELLS, of Dublin, hoped there would be no attempt to turn the Conference into a trade union; the PRESIDENT thought there was no danger of this.

The motion was carried.

COMMITTEE OF MEDICAL MEN AND PHARMACISTS

Mr. E. F. HARRISON then moved the following motion:—"That the British Pharmaceutical Conference appoint ten representatives to form, with ten representatives of the British Medical Association, a Joint Standing Committee, to promote the realization of aims found to be common to both bodies." He explained that this motion was the outcome of a paper read by Mr. Tocher at a meeting of the Conference last year. He detailed the negotiations with the British Medical Association on the matter, and said they owed Mr. Peck very hearty thanks for what he had done in connexion with the matter. The names of the proposed Committee were Messrs. Gadd, Druce, Wells, Righton, McMillan, Gamble, C. T. Allen, Clague, Tocher, R. Wright, and the two Hon. Secretaries.

The PRESIDENT remarked that he had just heard that the British Medical Association had appointed their members. The resolution was carried unanimously, and those whose names were suggested were elected to serve.

LIST OF OFFICERS FOR 1911

On the motion of Mr. T. H. W. Idris seconded by Mr. Neathercoat, the following officers for 1911 were elected:—President, Mr. W. F. Wells; Vice-Presidents, Messrs. J. F. Harrington, J. P. Gilmour, John Smith, Edmund White, H. G. Greenish, T. A. White; Hon. Treasurer, Mr. John C. Umney; Hon. General Secretaries, E. Saville Peck and Horace Finnemore; Executive Committee, Messrs. F. W. Branson, F. F. Harrison, T. Maltby

Clague, H. W. Gadd, D. Lloyd Howard, F. W. Gamble, C. E. Stuart, W. A. Bell, F. H. Alcock.

Mr. Wells thanked the Conference for the honour done him in electing him President. He realized that it was a great responsibility.

Votes of Thanks

Mr. Druce proposed that the cordial thanks of the Conference be given to the University, Colleges, and all other authorities for granting the use of the various halls, etc., to the Conference. Mr. Peck seconded, and the resolution was unanimously adopted.

Mr. R. A. Robinson proposed, and Mr. F. W. Branson seconded, a vote of thanks to Sir T. Clifford Allbutt and the members of the medical profession for the reception on Thursday evening.

Mr. Kirkby proposed a vote of thanks to the Local Committee and to the Ladies' Committee, and this was seconded by Mr. Maltby Clague, supported by Mrs. H. Finnemore, and carried with applause.

Mr. Arthur Deck, Mr. J. Evans and Mr. H. Flanders replied.

Mr. Naylor proposed, and Mr. Giles seconded, a hearty vote of thanks to the President of the Conference, to which Mr. Ransom replied.

Thanks were also accorded to Messrs. Peck and Finnemore, the Honorary General Secretaries.

THE SOCIAL GATHERINGS

Reception by the President and Mrs. Ransom

On Monday evening, July 25, Mr. and Mrs. Ransom and Dr. Reynolds Green and Mrs. Green held a reception for members and their friends in the magnificent Hall of St. John's College. The grandeur of the College, supplemented by the choicest decorations, elicited the admiration of the large number of guests present. On the walls hung the pictures of famous St. John's men of days gone by and also portraits of those who were responsible for the foundation of the college, which is one of the oldest in Cambridge. The guests were entertained by the St. John's College Chapel Choir, under the able conductorship of Dr. Cyril Rootham. A delightful programme of music, consisting of madrigals and part songs, was rendered by the choir, whose splendid singing drew forth the heartiest applause of the audience.

The Ladies at Newnham College

On Tuesday morning, immediately after the President's address, those ladies who were not specially interested in the scientific papers visited Newnham College. The party, numbering about 100, under the guidance of Mr. Arthur Deck and Mr. T. J. Mallett, was received by the Principal (Miss Stephen) and conducted over the interesting buildings.

Garden Party at Emmanuel College

On Tuesday afternoon a garden party took place in the Fellows' garden of Emmanuel College, tea being served in the dining hall. During the afternoon a photograph of the party was taken.

Organ Recital and Concert

At 8.30 on Tuesday evening, visitors to the Conference were delighted by an organ recital in King's College Chapel by Dr. Mann. The Chapel is one of the most beautiful in the land, and dates back to the reign of Henry VI. From the Chapel the visitors proceeded to the hall, where refreshments were served.

A concert followed, and Cambridge is to be congratulated on the talent displayed.

The Ladies at Girton College

On Wednesday morning the Local Committee of Ladies took the lady visitors, with many gentlemen, in brakes and motor-cars to Girton College, the interior of which was fully explained by the students in charge. The suites of rooms, the kitchen arrangements, the class-rooms, physical and chemical laboratories, and the swimming baths were inspected.

Visit to Ely

On Wednesday afternoon a very enjoyable visit was paid to Ely, the party being accompanied by the two daughters of Mr. Lincolne, of Ely, who was in charge of the afternoon's arrangements. The Cathedral was visited, and there the visitors were honoured by Dean Kirkpatrick, who explained the beauties of the Cathedral architecture, and subsequently he with Canon Kennett showed the party round the sacred edifice. Subsequently an organ recital was given by the organist, Dr. Wilson, after which an adjournment was made to the City Hall, where tea, over which Mr. Druce presided in the enforced absence of Mr. Ransom, was provided by the Local Committee. The party were favoured by Bishop Chase with permission to roam around the delightful grounds attached to the palace, and considerable interest was taken in an enormous specimen of the plane tree growing on the centre of the lawn, and near which was attached this interesting legend: "Planted 1674 by Bishop Gunning (1674-1684). Height in 1896, 100 ft., spread of branches 104 ft. in diameter, girth, 3 ft. from ground, 23 ft.—Alwynne Ely, 1898."

Concert at University Arms Hotel

On Wednesday evening a smoking concert was held at the Headquarters (the University Arms), and was very well attended. Mr. R. A. Robinson presided, and an excellent programme was rendered by various members.

Excursion to Saffron Walden

On Thursday, after the Session of Conference, a visit was paid to Saffron Walden, where several places of interest were

inspected. Permission to view Audley End House was greatly appreciated. Lunch and tea were served at the Town Hall.

Reception by the Medical Profession

In the evening on Thursday a reception was given to the Conference by the medical profession. The guests were received by Sir T. Clifford Allbutt, K.C.B., in the New Examination Hall. The following was the programme: Short address by Professor Nuttall, "Recent Investigations on the Drug Treatment of Protozoal Diseases"; Demonstration by Mr. C. T. Heycock, M.A., F.R.S., "Apparatus for measuring High Temperatures"; Demonstration by Dr. Dixon, "The Action of Ergot and Adrenaline on the Rabbit's Heart"; Demonstration with lantern slides by Dr. Graham Smith, "On House Flies in relation to Disease." The Philosophical Library and the Humphry Pathological Museum were also open to inspection.

We believe this is the first occasion upon which the Conference has been entertained in this way, and the hearty thanks of the members are due to the organisers of this successful evening.

Delegates to Cambridge Meeting, 1910

Pharmaceutical Society.—President, Mr. J. F. Harrington, Vice-President, Mr. W. L. Currie; Messrs. Allen, Cross, Cuff, F. J. Gibson, Gifford, Harrison, Hobbs, Neathercoat.

Pharmaceutical Society (North British Branch).—Chairman, Mr. J. P. Gilmour; Vice-Chairman, Mr. Wm. Giles; Messrs. W. B. Cowie, Kerr, W. P. Wilson.

Pharmaceutical Society of Ireland.—President, Mr. John Smith; Treasurer, Mr. G. D. Beggs; Messrs. Goldon, Watson, Wells.

Aberdeen Pharmaceutical Association.—Messrs. Giles, Hay, J. P. Kay.

Bath and District Pharmaceutical Association.—Mr. H. R. Pryke.

Bradford and District Chemists' Association.—Mr. A. Hanson.

Croydon and District Pharmacists' Association.—Messrs. F. W. Ashton and F. W. Peck.

Derby Chemists' Association.—Mr. S. Taylor.

East Aberdeenshire Pharmacists' Association.—Mr. J. F. Tocher.

Edinburgh Chemists' Assistants' and Apprentices' Association. —Messrs. Duncan and J. R. Hill.

Exeter Pharmaceutical Association.—Mr. H. Wippell Gadd.

Forfarshire and District Chemists' Association.—Messrs. Kerr and Macfarlane.

Glasgow and West of Scotland Chemists' Association.—Messrs. W. L. Currie and J. P. Gilmour.

Guildford and District Chemists' Association.—Mr. J. H. Mather.

Huddersfield and District Chemists' Association.—Messrs. Stephens and Walshaw.

Leeds and District Chemists' Association.—Messrs. J. H. Beacock, W. D. Pollitt, F. P. Sargeant.

Leicester Chemists' Association.—Mr. S. F. Burford.

Liverpool Chemists' Association.—Sir Edward Evans, Messrs. T. F. Abraham and P. H. Marsden.

London.—London Chemists' Association.—Messrs. S. H. Campion, J. W. Douglas, T. H. W. Idris, J. C. Pentney, J. C. Umney. *Western Pharmacists' Association.*—Mr. Ed. White. *Chemists' Assistants' Association.*—Messrs. F. W. Crossley-Holland, A. L. Arrowsmith. *Public Pharmacists' and Dispensers' Association.*—Mr. C. T. Rutter.

Manchester Pharmaceutical Association.—Messrs. A. H. Barlow, F. W. Bates, A. E. H. Blackburn, A. L. Blain, J. H. Franklin, J. Grier, W. Griffiths Hughes, C. A. Johnstone, J. C. Kidd, W. Kirkby, W. Lane, J. Wild, G. S. Woolley.

Midland Pharmaceutical Association.—Messrs. F. H. Alcock, W. G. Cross, F. J. Gibson, J. Poole, F. Smith.

Newcastle Chemists' Association.—Mr. T. Maltby Clague.

North Kent and District Pharmacists' Association.—Messrs. R. Feaver Clarke and A. Goldthorpe.

North Staffordshire Chemists' Association.—Mr. Edmund Jones.

Nottingham and Notts Pharmaceutical Association.—Messrs. W. S. Adamson and A. Middleton.

Oxford and District Chemists' Association.—Messrs. C. Bellamy, Alderman Clayton, John Dolbear.

Portsmouth and District Pharmacists' Association.—President, Mr. T. A. White; Vice-President, Mr. W. A. Bell; Secretary, Mr. T. O. Barlow.

Stockport and District Pharmacists' Association.—Messrs. J. C. Arnfield, G. Bennett, W. P. Orrell.

Torquay and District Pharmacists' Association.—Messrs. H. F. Bourne and E. Quant

LIST OF MEMBERS ELECTED DURING THE YEAR:

		Proposed by
Sept. 29, 1909.	Campkin, A. S., Cambridge .	Mr. Peck.
	Deck, A. A., Cambridge . .	,,
	Green, Dr. J. Reynolds, Cambridge	,,
	Lincolne, W., Ely	,,
	Mallett, T. J., Cambridge . .	,,
	Ridley, Thos., Carlisle . . .	,,
	Schaer, F., Purley	Mr. Finnemore.
	Turner, A. H., Monton . .	Mr. Vallance.
Dec. 1, 1909.	Barnes, Ivor P., London . .	Mr. Peck.
	Blair, W. R., Bolton . . .	,,
	Hinks, Ed., B.Sc., F.I.C., London	Mr. Finnemore.
	Razzack, S. A., Hyderabad .	Mr. Peck.
	Wilson, H., Southampton .	,,
April 1, 1910.	Andrews, Fred., London . .	,,
	Bennion, R., Watford . . .	Mr. Finnemore.
	Brown, E. J., Edinburgh . .	Mr. Duncan.
	Lockyer, Dr. C., Birchington .	Mr. Peck.
	Lucas, H., London . . .	Mr. Finnemore.
	Marsh, A. E., Leicester . .	Mr. Ransom.
	Massey, R. E., Rugeley . .	Mr. Finnemore.
	Robbins, H. H., Ilford . .	,,
	Sharp, E. F. W., Manchester .	Mr. Peck.
	Will, R., Aberdeen . . .	Mr. Hay.
	Wilson, T., Burntisland . .	Mr. Peck.
May 19, 1910.	Bell, W. A., Southsea . . .	Mr. Barlow.
	Sparrow, A. B., Southsea . .	,,
	Neathercoat, E. T., Weybridge	Mr. Finnemore.
	Poole, W., Newcastle, Staffs. .	,,
	Hill, J. W., Warrington . .	,,
	Willcox, Dr. W. H., London .	,,
	Dunlop, Dr. C. J. B., Dublin .	Mr. Wells.
	Smith, W. H., Southport . .	Mr. Righton.
	Hall, J. W., Peterborough .	Mr. Peck.

July 5, 1910.	Ashmore, W. H., Dublin . .	Mr. Finnemore.
	Beresford, F. H., Victoria .	Mr. Ransom.
	Bunker, S. W., London . .	Mr. J. C. Umney.
	Campion, S. H., London . .	Mr. Peck.
	Cuff, J. H., London . . .	,,
	Eden, W. J., Manchester . .	Mr. Finnemore.
	Hall, S. G., London . . .	Mr. Peck.
	Hewlett, Prof., R. T., London	,,
	James, C. H., Cheltenham .	Mr. Palmer.
	Kay, S., Stockport . . .	Mr. Finnemore.
	Kingzett, C. T., London . .	Mr. Peck.
	Shears, J. C., London . . .	Mr. Finnemore.
	Turner, H. S., St. Ives . .	Mr. Campkin.
	Walker, J. T. A., London . .	Mr. Peck.
	Walshaw, R. C., Huddersfield	Mr. Finnemore.
	Woodcock, R. C., London .	Mr. Peck.
July 25, 1910.	Arnfield, H., Stockport . .	Mr. Finnemore.
	Brown, G., Croydon . . .	Mr. Peck.
	Feilmann, H., London . .	,,
	MacSweeny, E., Dublin . .	Mr. Finnemore.
	Moore, F. S., Castle Cary . .	Mr. Peck.
	Morgan, H. B., Liverpool. .	Mr. Finnemore.

HONORARY MEMBERS

LADENBURG, Albert, Ph.D , Hon. M.D., Professor of Pharmacy, University of Breslau, 108, Kaiser Wilhelm-Strasse, Berlin.

MAIDEN, Joseph Henry, F.L.S., Director of Botanic Gardens and Government Botanist, Sydney, N.S.W.
MELLO, J. C. de, Campinas, Brazil.

PETIT, A., Rue Favart, 8, Paris.
PRAIN, David, Lieut.-Colonel, I.M.S., M A., M.B., LL.D. (honoris causâ), Director of Royal Botanic Gardens, Kew.

REMINGTON, J. P., Professor of Pharmacy, College of Pharmacy, 145, North Tenth Street, Philadelphia, United States.

SAUNDERS, W., London, Ontario, Canada.
SCHACHT, C., Ph.D., 56, Mittelstrasse, Berlin, Germany.

TSCHIRCH, Prof. Dr. A., Direktor des Pharmazeut. Institutes, Der Universität, Berne, Switzerland.

FOREIGN AND COLONIAL MEMBERS

Aickin, G., The Pharmacy, Queen Street, Auckland, N.Z. (Year-Book to Evans Sons Lescher & Webb, Ltd., Bartholomew Close, E.C.).

Backhouse, H. N., 5, Rue de la Paix, Paris.
Barnes, Prof. J. H., B.Sc., F.I.C., F.C.S., Government College of Agriculture, Lyallpur, Punjab, India.
Barrett, Arthur A., Pozzo Leone 31, Messina.
Beeby, A., 178, Worcester Street, Linwood, Christchurch, N. Z.
Bemrose, J., F.C.S., F.I.C., 56, St. Famille Street, Montreal (Year-Book to Horner & Sons, Mitre Square, E.C.).
Beresford, Fred H., Lilydale, Victoria.
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Butcher, C., Cronulla, New South Wales.

Champion, G. A., "Haraldine," Chelmsford Road, Durban, Natal.
Chapman, W. H., 19, St. Luke Street, Montreal, care of Lyman & Co. (Year-Book to Horner & Sons, Mitre Square, E.C.).
Coaker, Norwood, Ladybrand, Orange River Colony.
Cook, G. E., Downing Street, King William's Town, South Africa (Year-Book to Evans Sons Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Cooper, J. W., c/o R. R. Dower, Bedford, Cape Colony.
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Flint, Charles Bruce, Mount Gambier, South Australia.
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Fritzsche, Karl, care of Messrs. Schimmel & Co., Miltitz, near Leipzic, Saxony.

Garibaldi, J. A., 21, Church Place, Gibraltar.
Garner, W. W., Perth, S.A. (care of F. H. Faulding & Co., 54, Great Tower St., E.C.)
Gasson, W., Kimberley, South Africa.
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Gokhale, Dr. K. N., The Indian Pharmacy, Girgaum, Bombay.
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Ontario College of Pharmacy, Toronto—

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Hargreaves, John, *Vice-President.*
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Stewart, Alex.
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Wigle, E. R.

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Woolcott, J. N., Warracknabeal, Victoria.
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Anderson, James, 70–74, Commercial Street, Dundee.
Anderson, John, 14, Strathmartine Road, Dundee.
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Arnfield, J. C., 7 & 9, Lower Hillgate, Stockport.
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Atkins, W. R., Market Place, Salisbury.
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Attfield, Prof. J., Ph.D., F.R.S., "Ashlands," Watford, Herts.

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Barclay, Sir Thomas, 19, Lower Priory, Birmingham.
Barclay, Thomas, New Charford Mills, Saltley, Birmingham.
Barfoot, J. R. D., 72, West Bars, Chesterfield.
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Bayne, Thomas, Blandfield Chemical Works, Wheatfield Road, Edinburgh.
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Bird, F. C. J., Devon Wharf, Emmott Street, Mile End, London, E.
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Blair, Richard, 7, Patrick Street, Cork.
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Blake, R. F., F.I.C., F.C.S., Chemical Dept., Queen's College, Belfast.
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Booth, S. V., 25, Grosvenor Road, Tunbridge Wells.
Botham, Wm., 416, Bury New Road, Higher Broughton, Manchester.
Bourdas, I., Dunoon House, 3, Nightingale Lane, Clapham Common, S.W.
Bourdas, Isaiah, junr., 6, Pont Street, Belgrave Square, S.W.
Bourne, H. Frederick, 11, Strand, Torquay.
Bowis, W. J., Ph.D., F.C.S., 97, North Road, West Bridgford, Nottingham.
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Branson, F. W., F.I.C., F.C.S., 14, Commercial Street, Leeds.
Breadner, C. G., 268, Waterloo Road, Cheetham, Manchester.
Bremner, W., Port Erroll, Aberdeenshire.
Bremridge, R., 17, Bloomsbury Square, W.C.
Brewis, E. T., F.I.C., 31, Belgrave Road, Leyton, Essex.
Bridge, G. E., 128, Old Christchurch Road, Bournemouth.
Brier, Ernest Westgate, Elland, Yorks.
Bright, R., 29, Broad Bridge Street, Peterborough.
Brodie, R., 253, Crown Street, Glasgow.
Brooks, J., 42, Shudehill, Manchester.
Brown, D. Rainy, Abbey Hill Chemical Works, Edinburgh.
Brown, David, F.R.S.E., Abbey Hill Chemical Works, Edinburgh.
Brown, E. J., The Royal Dispensary, Edinburgh.
Brown, George, "Forres," Elgin Road, Addiscombe, Croydon.
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Buck, Anthony S., 179, Bedford Street, Liverpool.
Buckingham, H., 279A Witton Road, Aston Manor, Birmingham.
Buckle, J., 20, Market Place, Malton, Yorks.
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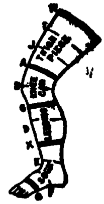

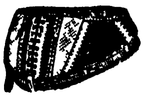

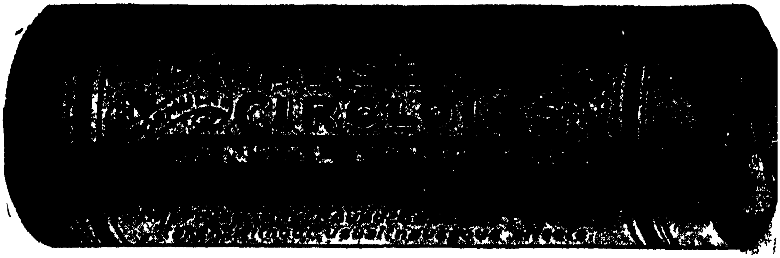

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